

THE PRACTITIONER

Edited by

SIR HUMPHRY ROLLESTON, Bt

GCVO, KCB, MD, DSc, FRCP

and

ALAN MONCRIEFF

MD, FRCP



JANUARY—JUNE 1944

THE PRACTITIONER
5 BENTINCK STREET, LONDON, W 1

1944

All Rights Reserved

GENERAL INDEX

TO VOLUME CLII

INDEX OF SYMPOSIUMS

	PAGE
Symposium on problems of rheumatism - - - - -	1—33
— on diseases of the eye - - - - -	65—93
— on gynaecology - - - - -	129—159
— on indigestion - - - - -	193—265
— on disorders of the skin - - - - -	281—317
— on disorders in warm weather - - - - -	345—376

INDEX TO NAMES OF AUTHORS

	PAGE
ABRAHAM, SIR A Summer sports - - - - -	352
ALLEN, F. M. B. Indigestion in infancy - - - - -	225
BACH, I. Management of early rheumatoid arthritis - - - - -	20
BARBIT, H. W. Sulphonamides in dermatology - - - - -	281
BOURNE, A. Sterility - - - - -	135
BRANWELL, C. Interpretation of physical signs I—Physical methods of examination in cardiology - - - - -	53
CLAYTON, F. Future of spa treatment - - - - -	26
DAVIDSON, M. Interpretation of physical signs II—In lung disease - - - - -	113
DAVIES-COLLEY, R. Role of surgery in dyspepsia of extra-p gastric origin - - - - -	204
DODDS, I. C. Hormones used in gynaecological practice - - - - -	129
FISHER, J. W. Emergency narcotic treatment of the mental case - - - - -	105
LITCH, W. K. Sulphonamides some further pharmaceutical observations - - - - -	34
FORD, ROSA. Chronic ill health due to para-nasal sinusitis - - - - -	174
FRANKLIN, R. H. Some principles in the treatment of burns - - - - -	167
GARDINER HILL, H. Recent advances in endocrinology - - - - -	94
GARROD, L. P. The Therapeutic use of penicillin - - - - -	318
GILL, A. MORTON. Gastroscopy - - - - -	245
GUTH, ARYATACK, V. B. Interpretation of physical signs VI—In gynaecology - - - - -	392
HARRIS, J. L. Psychosomatic medicine and the rheumatism problem - - - - -	6
HAYMAN, N. BISHOP. Lenses and glasses - - - - -	65
HAY, C. B. Psoriasis in the rheumatism - - - - -	16

GENERAL INDEX

	PAGE
HENDERSON, J L Skin disorders in the new-born infant - - -	310
HENDRY, A W Indigestion in diseases of the nervous system - - -	251
HENRY, C BOWDLER Indigestion and the teeth - - -	261
HILL, GLADYS Diagnosis and treatment of carcinoma of the cervix - - -	148
HINDS-HOWELL, C M Interpretation of physical signs III —In diseases of the nervous system - - -	178
HORDER, LORD Rheumatism a national problem - - -	1
HURST, SIR A Indigestion and national health - - -	193
INGRAM, J T Acne vulgaris - - -	304
JOHNSTONE, R W Dyspareunia - - -	142
KNIGHT, G C Significance of minor head injuries - - -	377
LAKIN, C E Interpretation of physical signs IV —In abdominal disorders - - -	266
LAPAGE, C PAGET Indigestion in older children - - -	219
LEWIS, A Psychological aspects of indigestion - - -	257
LOVE, R J McNEILL. Complications of gall-stones - - -	160
MACCALLAN, A F Some diseases of the eye met with abroad - - -	71
MACCORMAC, H Scabies - - -	291
MUSTARDÉ, J C Some medical aspects of Axis prison camps - - -	45
NAISH, F CHARLOTTE: Some problems of breast-feeding - - -	384
O'CONNOR, J M Water metabolism in relation to hot weather - - -	345
ORMEROD, F C Interpretation of physical signs V —In otolaryngology - - -	331
PATEY, D Treatment of infections of the hand the necessity for a new approach - - -	329
PUGH, MARY Orthoptic treatment - - -	88
REYNOLDS, F NEON Indigestion during pregnancy - - -	210
SEDDON, H J Early management of peripheral nerve injuries - - -	101
SHAW, M Gastritis - - -	238
SLIMMONDS, ROSE M. Diet in hot weather - - -	370
SMITH, J FERGUSON Causes and treatment of acute dermatitis - - -	297
SMITHARD, E H R Public health aspects of diseases prevalent in warmer weather - - -	355
SOMMERVILLE, J Skin disorders of warmer weather - - -	362
SORSBY, A. Tuberculosis of the eye - - -	79
TIDY, SIR H Peptic ulcer - - -	197
WALKER, R M Heredity of blood groups - - -	324
WARNER, E C Early diagnosis of carcinoma of the stomach - - -	329
WAY, S Ovarian tumours - - -	155
WILLIAMSON-NOBLE, F A. Contact lenses - - -	82

NAMES OF INDEX AND SUBJECTS

Abbreviations *abs* = Abstract, *NQ* = Note and Query

	PAGE
Abdomen, auscultation of - - - - -	276
——, contour of, localized changes in - - - - -	268
——, cutaneous signs of - - - - -	269
——, disorders of, physical signs in - - - - -	266
——, distension of, causes of - - - - -	267
——, examination of, procedure, inspection and palpation - - - - -	266
——, mensuration of - - - - -	276
——, pain in - - - - -	269
——, ———, gynaecological causes of - - - - -	393
——, palpation of, diagnostic - - - - -	271
——, percussion of - - - - -	276
——, retraction of, causes of - - - - -	268
——, rigidity of, causes of - - - - -	268
——, tumour of, diagnosis of - - - - -	275
Abdominal wall, anterior, immobility of, causes of - - - - -	266
Abortion, habitual, treatment of, progesterone - - - - -	132
——, signs of - - - - -	395
Abscesses in new-born - - - - -	311
——, retropharyngeal - - - - -	333
——, subphrenic, palpation in - - - - -	272
——, treatment of, penicillin - - - - -	322
Acne vulgaris, differential diagnosis of - - - - -	305
——, etiology of - - - - -	304
——, management of, general - - - - -	306
——, treatment of, hormones - - - - -	308
——, ———, local - - - - -	307
Actinomycosis, treatment of, sulphadiazine - - - - -	<i>abs</i> 277
Aggranulocytosis, treatment of, sulphadiazine - - - - -	<i>abs</i> 190
Air swallowing in infants, treatment of - - - - -	227
Alcohol, use of, in chronic dementia - - - - -	108
Alcohol-chloral group of narcotics - - - - -	108
Allergy in ophthalmology - - - - -	79
Amenorrhoea treatment of low-dosage irradiation - - - - -	<i>abs</i> 180
Amylene hydrate use of in mental diseases - - - - -	109
Anemia in carcinoma of stomach - - - - -	232
Anesthesia, spinal, continuous intravenous adrenaline in - - - - -	<i>abs</i> 124
Aneurysm abdominal, diagnosis of - - - - -	275
Anxiety and indigestion - - - - -	193
Aortic incompetence and stenosis, physical examination in - - - - -	55
Appendicitis, acute sequels of, dyspeptic symptoms - - - - -	207
——, palpation in - - - - -	271
——, sub acute, recurrent, with ileo-caecal adenitis - - - - -	207
Appendix and dyspepsia - - - - -	206
Argyll-Robertson pupil - - - - -	180
Arrhenoblastoma of ovary - - - - -	157
Artery posterior inferior cerebellar thrombosis of - - - - -	181
Ascites in carcinoma of stomach - - - - -	233
——, signs of - - - - -	398
Asthenia in carcinoma of stomach - - - - -	233
Ashma treatment of intravenous injections of novocain - - - - -	<i>abs</i> 403
Athlete's foot treatment of - - - - -	366
Atrophy, optic, causes of - - - - -	179
——, progressive muscular - - - - -	184
Auricular fibrillation, pulse in - - - - -	58
Baldwin's rigid-leg-raising test - - - - -	395
Barbiturates, use of in mental diseases - - - - -	112
Bathing, open air, precautions in - - - - -	353
——, ———, risks in - - - - -	356
Beer, nutritive value of - - - - -	371
Bell's palsy - - - - -	181
Beri beri in Axis prison camps - - - - -	49

	PAGE
Biliary passages, gall-stones impacted in	164
Biopsy of endometrium in diagnosis of sterility	138
Birth-marks	317
Blackheads	304
Bladder, alkaline incrustations of, treatment of	abs 403
Blepharitis	71
—, treatment of, penicillin	323
Blinking, variation in rate of	69
Blood groups, A, O, B	325
—, classification of	324
—, laws of heredity in	324
—, M and N	327
—, medico-legal significance	328
—, Rh factor	327
— picture in diagnosis of rheumatoid arthritis	21
— pressure, estimation of	56
Boils, in new born	311
Brain, injuries to, serious, by minor accidents	379
Breast-feeding, accessories to	391
—, argument for	384
—, defective secretion of milk, causes of	387
—, management of	385
—, test feeding	385
Bronchi, carcinoma of, primary, physical signs in	119
Bunyan bag treatment of burns	170
Burns, shock in	168, 172
—, treatment of, aims of	167
—, —, —, dyes	170
—, —, —, fatty base sulphanilamide ointment	abs 121
—, —, —, first aid	172
—, —, —, greasy dressings combined with sulphonamide powder	171
—, —, —, irrigation envelope	170
—, —, —, morphine	NQ 337
—, —, —, penicillin	322
—, —, —, saline compresses and baths	170
—, —, —, tannic acid	168
Calmette, ophthalmic reaction of	79
Cardiac impulse, maximal	53
Cardiovascular disorders, treatment of at spa	31
Cellulitis in new born	311
Cerebellum, lesions of, physical signs of	183
Cerebral vessels, arteriosclerosis of, symptoms of	185
Cervix, carcinoma of, international classification of	151
—, —, —, symptoms and signs of	149
—, —, —, treatment of	151
—, —, —, —, complications	154
—, —, —, —, radium or operation, indications for	152
—, —, —, —, type of growth	148
—, infection of, and sterility	140
Cheese dishes for hot weather	373
Cheirpompholyx, diagnosis from scabies	294
—, treatment of	365
Chloral hydrate, use of, in mental diseases	109
Chloralamide, use of, in mental diseases	110
Cholangitis complicating gall-stones	162
Cholecystectomy, modified, advantages of	166
Cholecystitis, acute, complicating gall-stones, treatment of	160
—, chronic, dyspeptic symptoms in	205
Chorea	184
Chorionic gonadotrophin, use of, in gynaecology	129, 133
Comedones	304
Cotus, biological object of	135
—, painful	142
Complementary feeding	385

	PAGE
Conjunctiva, diseases of, met with abroad	72
Conjunctivitis, acute	72
—, chronic	73
—, follicular	73
—, phlyctenular	74
—, swimming-bath	185
—, trachomatous	74
—, treatment of, penicillin	74
—, vernal or spring	74
Contact lenses	82
—, a-focal spherical	82
—, fitting, stock moulds	83
—, indications for	84
—, individually moulded	83
—, plastic	87
—, training for wearing	86
Colic appendicular	208
Cope's obdurator and psoas test	395
Cough short dry, in lung diseases	115
Cranial nerves disorders of, physical signs in	179
Cryptorchidism, treatment of, gonadotrophic extracts	99
Cyanosis, significance of	115
Cyclitis, chronic etiology of	81
Cystadenoma of ovary	156
Deafness	336
Deficiency diseases in Axis prison camps	49
Dental hygienists value of	264
— prophylaxis	264
Dermatitis acute, causes of, cosmetics	298, 299
—, —, —, hypersensitivity	298
—, —, —, irritants	297, 298
—, —, diagnosis of	299
—, —, patch tests in	300
—, —, treatment of	300
— herpetiformis treatment of, sulphonamides	288
— industrial	290
—, —, diagnosis from scabies	294
—, staphylococcal, in newborn	310
—, treatment of	311
—, streptococcal chronic, with recurrent erysipelas, treatment of, sulphona-	287
—, —, in newborn	313
Dermatology use of sulphonamides in	281
Derivoids, ovarian	156
Desert sores in Axis prison camps	51
Dhobie's itch, treatment of	366
Diabetes insipidus treatment of, pituitrin preparations	98
Diarrhoea, epidemic, in children decline of	359
—, mortality of, in hot weather	355
—, persistent in carcinoma of stomach	213
Diemestrol, use of, in gynecology	129, 132
Diet basic war time	374, 376
—, duly standard requirements	375
—, in acute dermatitis	300
—, in Axis prison camps	45
—, in early rheumatoid arthritis	24
—, in functional hyperinsulinism	95
—, in hot weather	370
—, in morning sickness	213
—, invalid in hot weather	376
Digestive disorders, treatment of at spa	27
Diphenylsulphone	43
Diverticuli, palpation in	273
Duodenum, ulcer of diagnosis of	199

	PAGE
Duodenum ulcer, of, incidence of	194
—, —, —, post-ulcer regime	196
—, —, —, treatment of	195
Dust and disease	361
Dysdiadochokinesia	183
Dysentery, bacillary, control of with sulphonamides	abs 123
— in Axis prison camps	45, 46
Dysgerminoma of ovary	157
Dysidrosis pompholyx, treatment of	365
Dysmenorrhœa, essential, treatment of, ethinyl œstradiol	abs 188
Dyspareunia, primary causes of	143
—, —, treatment of	144
—, —, secondary causes and treatment of	147
Dyspepsia and disease of appendix	206
— of gall-bladder	205
— and obstruction of intestines	208
— in essential autonomic disorders	255
— in functional nervous diseases	253
— in organic nervous diseases	253
—, gastroscopy in	247
—, nervous	253, 259
—, —, investigation and treatment of	254
— of extra-gastric origin, rôle of surgery in	204
Dyspepsias, surgical	205
Dysphagia	334
Dyspnoea, causes of	334
Dystrophy, muscular, idiopathic, treatment of, glycine	NQ 337
Ear, discharge from	336
—, diseases of, signs of	335
—, furuncle of, pain in	335
Eggs, dried, methods of serving in hot weather	373
Electrotherapy in early rheumatoid arthritis	23
Emotions and indigestion	257, 258
— and rheumatism	6
Empire Rheumatism Council	1, 2, 3, 5
Erdocervicitis, chronic, signs of	398
Endocrine disorders and sterility	141
—, treatment of, general principles and objectives	94
Endocrinology, advances in, recent	94
Endometriomas, signs of	397
Enteric fever	359
Enteritis, mortality of in hot weather	358
Entropion, treatment of	71
Enuresis, nocturnal, cause of, unusual	NQ 337
Ephelis, prevention and treatment of	363
Epidermophytosis, treatment of	366
Epilepsy, post-traumatic	383
Erysipelas in newborn	313
—, treatment of, sulphonamide	287
Erythema solare, etiology and treatment of	363
Ethisterone, use of, in gynæcology	129
Ethylsulphonol, use of, in mental diseases	112
Exercises, bed, in early rheumatoid arthritis	23
—, eye	66, 67, 69, 88, 92
—, —, limitations of	92
— in rheumatism	19
Expectorant, carbon dioxide inhalation as	abs 62
Extrasystoles, pulse in	58
Eyes, diseases of, met with abroad	71
—, effect of sunlight on	68
—, infections of, treatment of, chemotherapy	abs 339
—, irritation of, due to contact lenses	86
—, palsies of, differential diagnosis of	180
—, shapes of, different, causes of	65

	PAGE
Eye training - - - - -	67
—, tuberculosis of - - - - -	79
—, —, —, modified non-specific reactions - - - - -	81
—, —, —, simple non specific reactions - - - - -	79
Lashes, infestation of with crab louse - - - - -	71
Lids, diseases of, met with abroad - - - - -	71
Lenses, glasses and - - - - -	65
Fallopian tubes, patency of, and sterility - - - - -	137, 141
Fat intolerance in infants - - - - -	225
Fibroma, ovarian - - - - -	157
Fibrositis, psychosomatic medicine and - - - - -	10
—, treatment of at spa - - - - -	27
—, true - - - - -	11
Fingers, clubbing of, in lung diseases - - - - -	115
Fish dishes for hot weather - - - - -	373
Fistula, biliary, complicating gall-stones - - - - -	162
Fatulence in pregnancy, treatment of - - - - -	218
Fluids for hot weather - - - - -	370
Food poisoning in hot weather - - - - -	357
Foods, nutritive value of - - - - -	371
Foreign body in nose - - - - -	331
Fractional test-meal in carcinoma of stomach - - - - -	236
Fracture, infected compound, treatment of, penicillin - - - - -	321
Freckles, prevention and treatment of - - - - -	363
Rigidity, sexual, intractable - - - - -	NQ 187
Fruit, nutritive value of - - - - -	372, 373
Gall-bladder, adenoma and carcinoma of, complicating gall-stones - - - - -	165
—, —, and dyspepsia - - - - -	205
—, —, enlarged, diagnosis of - - - - -	274
Gall-stones complications of - - - - -	160
—, —, —, biliary fistula - - - - -	162
—, —, —, inflammatory - - - - -	160
—, —, —, new growths - - - - -	165
—, —, —, obstruction to biliary passages - - - - -	164
Gallop rhythm - - - - -	59
Gas-gangrene, treatment of, penicillin - - - - -	321
Gastric diathesis - - - - -	194, 195
— ulcer See Stomach ulcer	
Gastritis, acute - - - - -	238
—, —, in children - - - - -	219
—, —, symptoms, diagnosis and treatment of - - - - -	240
—, atrophic - - - - -	242
—, —, treatment of - - - - -	244
—, chronic - - - - -	241
—, —, carcinoma following - - - - -	193
—, —, gastroscopy in - - - - -	248
—, —, prophylaxis of - - - - -	244
—, —, symptoms and diagnosis of - - - - -	243
—, —, treatment of - - - - -	244
—, hemato-genous - - - - -	239
—, hypertrophic - - - - -	242
—, —, treatment of - - - - -	244
—, post-operative - - - - -	243
—, —, —, treatment of - - - - -	244
—, primary, acute etiology of - - - - -	239
—, secondary, acute, etiology of - - - - -	239
—, superficial - - - - -	242
—, suppurative - - - - -	239
Gastroscopy, complications of - - - - -	250
—, contraindications - - - - -	250
—, in carcinoma of stomach - - - - -	236, 248
—, in dyspepsia - - - - -	247

	PAGE
Gastroscopy in gastric hæmorrhage	249
— in gastritis	248
— in ulcers of stomach	201, 203, 247
—, indications for	247
—, normal appearances	246
—, technique of	245
—, use of, for research	247
—, —, —, pre- and post-operative	249
Genitalia, hypoplasia of, diagnosis of	392
Gestation, extra-uterine, signs and treatment of	396
Giddiness, post-traumatic	382
Glasses, value of	69, 92
Gloves, rubber surgical, use of talcum powder on, dangers of	abs 338
Gonadotrophic principles, varieties of	133
Gonadotrophin, use of in gynaecology	129, 133
Gonorrhœa, treatment of, penicillin	321
Gout, treatment of at spa	27
Graafian follicle, atretic, rupture of	394
Granulosa-cell tumours of ovary	157
Growth, defective, treatment of, gonadotrophic extracts	98
Gynaecology, physical signs in, interpretation of	392
—, use of hormones in	129
Hæmangiomas, types of	317
Hæmatemesis in carcinoma of stomach	233
Hæmatoma, subdural, symptoms and diagnosis of	377, 378
Hæmorrhage, adrenal, treatment of	100
—, in peptic ulcer, treatment of	202
—, middle meningeal, symptoms and diagnosis of	378, 379
Hand, infections of, treatment of, necessity for new approach to	329
—, —, —, treatment of, penicillin	322
Head, injuries of, minor, significance of	377
Headache of nasal origin	abs 402
—, post-traumatic	382
Heart, enlargement of, physical examination in	53
—, examination of, physical, classification of disability	59
—, —, —, functional disorders	57
—, —, —, heart failure	58
—, —, —, structural lesions	53
—, —, —, valvular lesions	54
— failure, physical examination in	58
— murmurs	54
—, percussion of	54
Heartburn in pregnancy, treatment of	216
Heat, excessive, results of	357
— pyrexia	350
Hemianopia, causes of	179
Herpes ophthalmicus	180
— zoster, symptoms of	185
Heterophoria, symptoms and treatment of	91
Hexæstrol, use of, in gynaecology	129, 132
Hirsuties, treatment of	365
Hoarseness, causes of	334
Holidays, correct use of	352
Hormone therapy	94
Hormones, female	129
—, male	129
—, sex	129
—, —, dangers of	134
—, use of, in gynaecological practice	129
Hirschprung's disease, treatment of, spinal anæsthesia	abs 278
Huntingdon's chorea	184
Hutchinson's summer prurigo, treatment of	363
Hydatid cysts, diagnosis of	276
Hydro æstivale, treatment of	364
Hydrocephalus, papilloedema in	179

	PAGE
Hypocine, use of, in mental diseases - - - - -	112
Hyperidrosis, treatment of - - - - -	366
Hyperinsulinism, functional and organic, diagnosis between - - - - -	96
—, —, treatment of, dietetic - - - - -	95
Hyperthyroidism treatment of, anti-thyroid substances - - - - -	96
Hypoglycemia, spontaneous - - - - -	95
Hypothyroidism and sterility - - - - -	136
Hystero-salpinography, value of - - - - -	392
Ichthyosis - - - - -	317
Impetigo, bullous, in newborn - - - - -	311
— contagiosa, treatment of, sulphonamide - - - - -	287
—, treatment of, local sulphathiazole - - - - -	282
—, —, —, penicillin - - - - -	323
Indigestion and national health - - - - -	193
— and teeth - - - - -	261
—, chronic, in children, symptoms of - - - - -	219
—, gastric, acute, in children, symptoms of - - - - -	219
— in infancy, protein - - - - -	225
— —, fat intolerance - - - - -	225
— in nervous diseases - - - - -	251
— in older children, acute, treatment of - - - - -	222
— —, chronic, treatment of - - - - -	223
— —, —, diagnosis of - - - - -	221
— —, —, dispositional elements - - - - -	224
— —, —, etiology of - - - - -	219
— —, —, physical examination in - - - - -	221
— of pregnancy, etiology of - - - - -	210
— —, morning sickness - - - - -	212
— —, symptoms of - - - - -	215, 216
— —, treatment of - - - - -	216
—, psychological aspects of - - - - -	257
Induration, benign, of newborn - - - - -	316
—, injection, in newborn - - - - -	317
—, traumatic, of newborn - - - - -	316
Infant, new-born, skin disorders of - - - - -	310
Infantilism, treatment of, æstrogenic substances - - - - -	131
Injections, air-contaminated, prevention of - - - - -	abs 122
Insects and disease incidence in hot weather - - - - -	361
Intermittent hepatic fever - - - - -	162
Intertrigo in newborn, treatment of - - - - -	315
—, vulval - - - - -	400
Intestines, obstruction of, diagnosis of - - - - -	abs 189
— obstructive lesions of, dyspeptic symptoms of - - - - -	208
Intra-abdominal tumour, diagnosis of - - - - -	275
Iritis, etiology of - - - - -	81
—, treatment of, penicillin - - - - -	323
Ketosis and calcium - - - - -	NQ 401
Kriurosia vulvæ, treatment of by æstrogenic substances - - - - -	132
Lactation, suppression of, with æstrogenic substances - - - - -	132
Landry's paralysis - - - - -	183
Lantoside C, administration of intravenous - - - - -	abs 124
Lenses contact - - - - -	82
Lentigo, prevention and treatment of - - - - -	363
Leprosy, spinal anæsthesia in - - - - -	NQ 120
Leucorrhœa, etiology of - - - - -	399
Lichen urticatus, diagnosis from scabies - - - - -	294
Ligat's sign in appendicitis - - - - -	294
Liver enlarged, diagnosis of - - - - -	273
Lumbago - - - - -	11
Lungs, consolidation of, physical signs of - - - - -	116

	PAGE
Lungs, diseases of, adventitious sounds in	118
—, —, —, inspection in	114
—, —, —, palpation, percussion and auscultation in	116
—, —, —, physical signs in	113
—, —, —, systematic examination in	114
Lupus erythematosus, symptoms and treatment of	364
—, treatment of, sulphonamide	288
Lymphangiomas	317
 Malaria and mosquitoes	356
— in Axis prison camps	52
March fracture, diagnosis of	abs 340
Mastoid infection, discharge in	336
Mastoiditis, acute, diagnosis of, X-ray, value of	abs 340
—, pain in	336
Meat dishes for hot weather	373
— extracts, nutritive value of	371
Meatus, auditory, carcinoma of, pain in	335
Medicine, psychosomatic, and rheumatism problem	6
Meig's syndrome	157
Melæna in carcinoma of stomach	233
Meningitis, treatment of, penicillin	323
Meningococcal carriers, treatment of, sulphadiazine	abs 338
Menopause, treatment of, æstrogenic substances	132
Menorrhagia, treatment of, progesterone	133
Menstruation, restoration of, in castrated women	131
Mental case, treatment of, emergency narcotic	108
— overstrain treatment of, at spa	28
Middle-ear infection, discharge in	336
Migraine, treatment of, sleep control in	abs 61
Miliaria in new born	314
— rubra, treatment of	365
Milk, dried, nutritive value of	371
Mitral stenosis, physical examination in	54
Moles, in new born	317
Morning sickness, management of	212
Morphine, solutions, tin containers for	abs 123
—, use of, in mental diseases	112
Mosquitoes, and malaria	356
Motor neurone, lower, lesions of	183
—, upper and lower, lesions of, effects of	182
— system, disorders of, physical signs in	182
—, extrapyramidal, lesions of	182
Myoclonus	184
Myopia, exercises in	67
 Napkin rash, differential diagnosis and treatment of	abs 277
—, treatment of	314
Narcotic treatment of mental diseases	108
Nausea in pregnancy, treatment of	217
Nerve, fifth cranial, loss of function of	180
— injuries, peripheral, management of, early	101
—, seventh cranial, loss of function of	181
—, ninth cranial, paroxysmal neuralgia and	181
Nervous etiology of indigestion in children	220
— system, diseases of, indigestion in	251
—, —, —, physical signs in	178
Nettle-rash in new born	34
Neuralgia, fifth nerve, types of	181
Neuritis, multiple peripheral	183
—, peripheral, symptoms of	185
Neurotics, gastro-intestinal symptoms in	260
Nose, foreign bodies in	331
—, physical signs in	331
—, polypi of	331

	PAGE
Occupation and rheumatism - - - - -	19
Occupational therapy in rheumatism - - - - -	19
Oestofollin, synthetic oestrogen - - - - -	<i>abs</i> 121
Oesophagitis in infants simulating dyspepsia - - - - -	228
Oesophagus, obstruction of, in infants simulating dyspepsia - - - - -	228
Estradiol benzoate, use of, in gynaecology - - - - -	129, 132
Estrone, use of, in gynaecology - - - - -	129, 131, 132
Official publications - - - - -	64, 128, 192, 408
Omentum, enlarged, diagnosis of - - - - -	275
Onphalitis in newborn - - - - -	313
Onychia in newborn - - - - -	310
Oral sepsis and digestive disorders - - - - -	262
Orthoptic training, aim of - - - - -	89
—— treatment - - - - -	88
Osteoarthritis, etiology of, emotional - - - - -	15
——, treatment of, at spa - - - - -	27
Osteoma, aural, pain in - - - - -	335
Otitis media, acute, pain in - - - - -	335
Ovary tumours of, benign - - - - -	156
——, ——, complications of - - - - -	158
——, ——, in pregnancy - - - - -	159
——, ——, incidence of - - - - -	155
——, ——, malignant - - - - -	157
——, ——, signs and symptoms of - - - - -	155
——, ——, treatment of - - - - -	156
Ovulation defective or infrequent, and sterility - - - - -	141
Oxytocin, use of - - - - -	129
Pain, hysterical - - - - -	8
——, referred, in abdominal disease - - - - -	269
Palsy, bulbar - - - - -	184
Pancreas, enlarged, diagnosis of - - - - -	275
Pancreatitis, acute, complicating gall-stones, treatment of - - - - -	161
——, ——, signs of - - - - -	273
Papilladema causes of - - - - -	179
Paraldehyde, use of, in mental diseases - - - - -	108
Paralysis agitans - - - - -	182
—— of abduction and adduction - - - - -	334
Para-nasal sinusitis, chronic ill health due to - - - - -	174
Parkinsonism, post-encephalitic - - - - -	182
Pediculosis capitis, treatment of - - - - -	368
Pellagra, symptoms and treatment of - - - - -	364
Pelvic adhesions and sterility - - - - -	136
Pemphigus in newborn - - - - -	311
Penicillin, bacteria susceptible and resistant to - - - - -	319
——, discovery and properties of - - - - -	318
——, therapeutic use of - - - - -	318
——, ——, local - - - - -	321
——, ——, systemic - - - - -	320
Peptic ulcer, aspirin and - - - - -	<i>NQ</i> 401
——, complications of - - - - -	202
——, diagnosis of - - - - -	199
——, etiology of - - - - -	198
——, incidence of - - - - -	197
——, perforation of, incidence of - - - - -	199
——, ——, treatment of - - - - -	202
——, ——, treatment of medical - - - - -	201
—— See also Stomach and Duodenal ulcer - - - - -	—
Perineotomy, bilateral, in dyspareunia - - - - -	146
—— in sterility - - - - -	139
Peripheral nerve injuries, closed, treatment of - - - - -	102
——, ——, diagnosis of - - - - -	101
——, ——, management of, early - - - - -	101
——, ——, open treatment of - - - - -	103
——, ——, primary suture in, indications for - - - - -	105

	PAGE
Peristalsis, visible, significance of—	270
Peritonitis, local	271
—, signs of	271, 396
Petroleum jelly, sterile, in paper tubes	abs 404
Phlebitis, in carcinoma of stomach	233
Phlyctenulosis, tuberculous—	79
Phthalyl-sulphathiazole	43
Physical methods of examination in cardiology	53
Physical signs, interpretation of, I, in cardiology	53
—, —, —, II, in lung disease	113
—, —, —, III, in diseases of nervous system	178
—, —, —, IV, in abdominal disorders	266
—, —, —, V, in otology	331
—, —, —, VI, in gynaecology	392
Pinguecula	72
Pituitrin tannate treatment of diabetes insipidus	98
Pleura, effusion of, signs of—	117
—, empyema of, treatment of, penicillin	323
Pneumothorax, spontaneous, physical signs in	117
Poliomyelitis, acute anterior	183
—, etiology of, in hot weather	360
Pollen and disease	361
Polyneuritis, in carcinoma of stomach	233
—, toxic, acute	183
Post-concussional syndrome	381
Pregnancy, ovarian tumours in	159
—, vomiting of, treatment of	abs 62

PREPARATIONS, ETC

Bellvit vitamin B₁ tablets, 344 Board of registration of medical auxiliaries 64 British Association of Otolaryngologists 128 British Pharmaceutical Codex, 6th suppl. 344 British pharmacopoeia, 1932, amendments 64 Callos Ltd diary 1944 64 Care of your new baby 403, Chartered Society of Physiotherapy, 128, Extra Pharmacopoeia, supplement to Vol. I, 280 Hepamuno 280, Insulin colour code 64 Insulin price reduction 280, Mental deficiency lectures 192 Monoject brand ampoule syringe 192 National Ophthalmic Treatment Board 128 Nupercaine handbook 128 Operative procedure 280, Pethidine hydrochloride 344 Pinoleum prescription pads 280 Princess Isahai Memorial Hospital Fund, 128, Prostigmin, 344 Proteolysed liver A and H 408 Scabies film 344 Sulfex, 408 Sulphamido-Urea, 64 Surgical rubber gloves 280 Thioracil, 408 Vitamins a general survey for the practising pharmacist, 192 Wellcome brand sterilized sulphanilamide and sulphanilamide compound 280

Prickly heat, treatment of	365
Prison camps, Axis, diet in	48
—, —, —, medical aspects of	45
Progesterone, use of, in gynaecology	129, 132, 133
Propanide	43
Promin	43
Prostate, carcinoma of, treatment of, diethylstilboestrol	NQ 120
—, —, —, —, synthetic oestrogens	99
Protein indigestion in infants	225
Pruritus vulvæ	NQ 337, 400
Pseudo-rheumatism	7, 8
Psoriasis	NQ 187
Psychoneurosis and non-arthritic rheumatism	6
Psychosomatic medicine and fibrositis	10
— and rheumatism problem	6
— and rheumatoid arthritis	12
Pterygium	72
Pulsation, unusual, in lung disease	115
Pulse rhythm	57
Pulsus alternans	59
Pupil, reactions of	180
Pustules in newborn	310
Pyelitis, acute, purgatives in	NQ 120
—, signs of	273
Pyloric obstruction in peptic ulcer, treatment of	202
Pylorospasm in infants, treatment of	228
Pylorus, hypertrophic stenosis of, congenital, symptoms and treatment of	226
Pyoderma, treatment of, local sulphonamide	282

	PAGE
Scabies treatment of, complicated by pyoderma	293
—, —, uncomplicated	292
Scintilla	11
—, treatment of, local saline injections	abs 121
Sclerema, of newborn	316
Sclerosis, amyotrophic lateral	184
—, disseminated symptoms of	185
Scoliosis, in relation to lung disease	115
Scotomas, causes of	179
Seborrhoeic diathesis	304
Sensory system, lesions of, physical signs of	185
—, —, objective phenomena	185
—, —, subjective symptoms of	185
Septum, nasal, deviation of	331
—, —, spur of	331
Shock in burns	168
—, —, treatment of	172
—, treatment of heat	abs 188
Sight, saving glasses	67
Sinus arrhythmia, pulse in	58
Sinuses, infections of, signs of	332
Sinusitis, catarrhal	NQ 60
—, para-nasal, chronic ill health due to	174
Skin, desquamation of, physiological, in newborn	317
— diseases due to altered social conditions	362, 367
— due to heat rays and increased humidity	362, 365
— due to ultra-violet irradiation	362, 363
— due to warmth and seasonal diet	362, 368
Skin-grafting in burns	170
Snellen's operation for trichiasis and entropion	71
Spi centre, diagrammatic plan of	28, 30
—, equipment and general management of	31, 32
— town, diagrammatic plan of	28, 29
—, treatment, future of	26
—, —, indications for	27
—, —, origin and organization of	26
— waters, use of	27
Spasms	184
Spectacles, eyesight and	65
—, value of	69, 92
Spinal cord, subacute combined degeneration of, symptoms of	185
Spleen, enlarged, diagnosis of	274
Sports, summer	352
—, —, problem of hyperpyrexia	353
Squint, etiology and treatment of	88
—, exercises in	67, 88
—, treatment of, operative, age for	91
—, —, —, orthoptic	88
Stannard bag treatment of burns	170
Staphylococcus aureus infection, treatment of, penicillin	320
Sterility, history taking, important points in	135
—, physical examination in	136
—, treatment of	139
Sulbactam treatment of carcinoma of prostate	99
—, use of, in gynaecology	129, 132
Stomach asthenic	254
—, carcinoma of, clinical examination in	233
—, —, —, diagnosis of early	229
—, —, —, diagnostic medical treatment in	236
—, —, —, etiology of	193
—, —, —, following chronic gastritis	193
—, —, —, gastric ulcer	193, 203
—, —, —, gastroscopy in	248
—, —, —, incidence of	229
—, —, —, investigation of	233
—, —, —, perforation in	233
—, —, —, symptoms of	232

	PAGE
Stomach, carcinoma of, symptoms of early, dyspeptic	229
—, —, —, —, —, obstruction	231
—, —, —, —, —, ulcer	230
—, hæmorrhage, gastroscopy in	249
—, hypertonic	253
—, nervous mechanisms of	251
—, surgery of, gastroscopy in relation to	249
—, ulcer of, carcinoma following	193, 203
—, —, —, constitutional predisposition to	257
—, —, —, gastroscopy in	247
—, —, —, incidence of	194
—, —, —, post-ulcer regime	196
—, —, —, symptoms of	200
—, —, —, treatment of	195
Stools, occult blood in, in carcinoma of stomach	236
Strabismus, etiology and treatment of	88
—, non-comitant, orthoptic treatment of	93
Streatfeild's operation for trichiasis and entropion	71
Succinyl sulphathiazole, use of as intestinal antiseptic	39
Sudamina, in newborn	314
—, treatment of	365
Sulphacetamide, use of, in burns of eyelids	40
—, —, —, in infections of mucous surfaces	40
Sulphadimethylpyrimidine, formula of	41
Sulphadiazine, dosage of	40
—, use of, in burns	41
—, —, —, in cranial wounds	41
Sulphaguanidine, dosage of	42
Sulphamethazine, clinical study of	abs 61
—, formula of	41
—, use of, in lobar pneumonia	42
Sulphanilamide, local applications of	36
—, sensitization to in pyoderms	283
—, use of, in bacilluria	37
—, —, —, in burns	37
—, —, —, in contaminated wounds	36
—, —, —, in erysipelas of newborn	313
—, —, —, in eye conditions	37
—, —, —, in influenza	38
—, —, —, in superficial infections	36
—, —, —, in tonsillitis	38
Sulphapyrazine	43
Sulphapyridine, sodium compounds of, use of, by mouth	43
—, use of, in pneumonia	39
—, —, —, in secondary hæmorrhage following tonsillectomy	40
Sulphathiazole, microcrystalline	38
—, sodium compounds of, use of, by mouth	43
—, use of, in abscess cavities	39
—, —, —, in impetigo contagiosa	38
—, —, —, in infections of conjunctiva	39
—, —, —, in infections of hand	329
—, —, —, in preservation of blood plasma	39
—, —, —, in pyogenic skin infections	39
—, —, —, in staphylococcal dermatitis	312
—, —, —, in trachoma	77
—, —, —, in wounds	39
Sulphathiazoline, use of, in gonorrhœal urethritis	39
Sulphonamides, use of, in mental diseases	111
Sulphonamide hypersensitivity, intradermal test for	abs 404
—, powder, use of, in burns	171
—, use of, in trachoma	77
Sulphonamides, compounds of	42
—, pharmaceutical observations on	34
—, ratio of activity of	34
—, sensitivity and hypersensitivity to	35
—, silver compounds of	42
—, sodium compounds of, use of, by subcutaneous injection	44

	PAGE
Sulphonamides, toxic reactions of - - - - -	35
—, use of, in dermatology, acute infections, results of - - - - -	285
—, —, —, —, —, chronic infections, value of - - - - -	285
—, —, —, —, —, dosage - - - - -	286
—, —, —, —, —, eruptions, value of - - - - -	286
—, —, —, —, —, local applications, risks of - - - - -	281
—, —, —, —, —, oral administration - - - - -	285
—, —, —, —, —, risk of sensitization - - - - -	282
Summer diarrhoea, decline of - - - - -	359
— eruptions, treatment of - - - - -	363
— sports - - - - -	352
Supplementary feeding of infants - - - - -	385
Surgery, abdominal early rehabilitation in - - - - -	abs 278
Suture of peripheral nerves - - - - -	105
Swallowing, difficult - - - - -	334
Sweat rashes in newborn - - - - -	314
—, treatment of - - - - -	365
Sweating, excessive, treatment of - - - - -	366
—, water and salt loss in - - - - -	348, 349, 350, 354
Sweet dishes for hot weather - - - - -	373
Syccosis barbe, treatment of, penicillin - - - - -	323
Sydenham's chorea - - - - -	184
Syphilis, congenital - - - - -	315
—, diagnosis from scabies - - - - -	294
—, treatment of, penicillin - - - - -	321
Systolic murmurs, apical, physical examination in - - - - -	56
Tabes dorsalis, symptoms of - - - - -	185
Tannic acid treatment of burns - - - - -	168
Tapeworms, treatment of - - - - -	NQ 60
Tea, nutritive value of - - - - -	371
Teeth and digestion - - - - -	261
—, effect of chewing-gum on - - - - -	NQ 187
— in relation to indigestion - - - - -	194
Temperature, body, maintenance of - - - - -	347
—, —, —, osmotic pressure and - - - - -	350
—, —, —, regulation of, in hot areas - - - - -	347
—, —, —, —, heat balance and loss - - - - -	346
—, —, —, water metabolism in relation to - - - - -	345
Testosterone use of - - - - -	129
Tetronal, use of, in mental diseases - - - - -	112
Thiourea and thiouracil, use of, in hyperthyroidism - - - - -	97
Throat lesions of, signs of - - - - -	332
— pain in significance of - - - - -	333
Thrombosis mesenteric, signs of - - - - -	273
Tic glossopharyngeal - - - - -	181
—, trigeminal - - - - -	181
Tics, diagnosis from chorea - - - - -	184
Tinea types and treatment of - - - - -	367
Tonsils lesions of - - - - -	332
Trachoma - - - - -	74
—, clinical signs - - - - -	76
— etiology and treatment of - - - - -	77
—, stages of - - - - -	75
Tremor, types of - - - - -	164
Trichiasis, treatment of - - - - -	71
Trichomonas infection of vagina - - - - -	399
Trional, use of in mental diseases - - - - -	112
Tuberculin jelly patch test - - - - -	abs 402
Tuberculosis, pulmonary, adventitious sounds in - - - - -	118
— treatment of, pneumoperitoneum - - - - -	abs 335
Typhoid in Axis prison camps - - - - -	47
Urticaria types and treatment of - - - - -	368
Uterus, small, and ϵ crutly - - - - -	140

	PAGE
Uterus, tumours of, signs of	398
Uveoparotitis, etiology of	81
Vagina, discharges from	399
—, examination of	399
—, —, in sterility	136
Vaginismus, psychopathic	176
— and sterility	137
—, treatment of	139
Vaginitis and sterility	139
Vegetables, nutritive values of	372
Venous engorgement and venous pulsation, diagnosis between	59
Vertigo, causes of	336
Vision, disorders of, in cranial nerve disorders	179
Vitamin deficiency in Axis prison camp diet	49
Vitamin E and reproduction	60
Vomiting in pregnancy, treatment of	217
Vulvitis, leucoplakic	400
Warm conditions, excessive, dangers of	351
Warts, plantar, treatment of, formalin solution	123
Water, distribution of, in body	345
— metabolism in relation to hot weather	345
—, nutritive value of	371
Waterhouse-Friderichsen syndrome	100
Weaning	391
Weather, hot, diet in	370
—, —, water metabolism in relation to	345
—, warmer, diseases prevalent in, public health aspects of	355
—, —, food poisoning in	357
—, —, mortality in	355
—, —, skin disorders of	362
Weight, loss of, in carcinoma of stomach	233
Whooping-cough, immunization against	120
Wool rash in new-born	315
Wound, operation, use of, penicillin in	322
— sepsis, treatment of, penicillin in	321 322
Xeroderma pigmentosum, treatment of	363
X-ray diagnosis of carcinoma of stomach	235
— of gall-stones	160

RHEUMATISM: A NATIONAL PROBLEM

By the Rt Hon The LORD HORDER, G C V O, M D, F R C P

*Physician in ordinary to H M the King, Consulting Physician, St Bartholomew's Hospital,
Chairman, Empire Rheumatism Council*

IN the symposium on rheumatism to which the present issue of *The Practitioner* devoted, five articles upon important aspects of the problem are contributed by men of known experience. Each article may be regarded as dealing with its respective aspect in the light of advanced knowledge, and will therefore be of considerable service to the practitioner who finds himself faced—and what a practitioner does not?—with the protean manifestations of rheumatic disease as they present themselves in general practice.

In the present article I will concern myself with the more general question of a nation that desires to exercise a humane and economic influence over the health of its citizens should deal with the large number of cases of rheumatic disease constantly present in its midst. This article, in other words, attempts a social and economic approach to the problem of rheumatic disease.

THE SIZE OF THE PROBLEM

The extent of the problem has been repeatedly explored and as repeatedly assessed. A conservative estimate of the number of adult sufferers in this country is over a million. The sum of pain and disablement implicit in this figure easily outweighs those caused by any other group of diseases. As for the economic burden, this is known to be £17,000,000 a year among the insured workers and it is probably in the region of £25,000,000 among the total population of England and Wales. In Scotland there are reasons for putting the estimate still higher. Five years ago the American Committee for the Control of Rheumatism made the statement that "chronic arthritis is generally recognized as the most important problem that chronic disease presents." A careful house-to-house survey of the State of Massachusetts has shown that there are more cases of chronic rheumatism to-day than of heart disease, tuberculosis and cancer combined.

It has been the business of the Empire Rheumatism Council to draw the attention of the authorities concerned to this state of affairs and to stimulate them to take action upon lines which the Council, after deliberation, laid down as being practicable. These lines, whilst including research into etiological factors, stressed the importance of early diagnosis and making much more widely available the means of efficacious treatments already known to the profession. The principle was laid down that "if all cases of rheumatic disease were diagnosed in their early stages and promptly submitted to the treatments which present medical science can suggest there would be a rapid and great reduction in the number of lives wrecked by its ravages." This being so, there is no possible justification for the idea that plans for the extension of facilities for treatment should await the final

by some degree of mobilization. For it has been shown that in many cases of arthritis treatment as an out-patient is more beneficial than as an in-patient; too much time spent in bed weakens the general tone and therefore reacts unfavourably upon the arthritic state.

RHEUMATISM CENTRES

There is no doubt at all that the national application of present methods of alleviation and cure of rheumatic disease would lift much of the burden of these distressing conditions from the community. In such "centres" as do at present exist this statement is amply justified by results. In the Buxton Hospital for Rheumatic and Allied Diseases, 2,617 cases out of 3,062 admitted during 1937-8 were discharged "cured or much improved"—a proportion of over 82 per cent. At Bath this figure is a little higher. At the British Red Cross Clinic (for out-patients only) the cures have been recorded as 60 per cent, the cases improved as 30 per cent. At the West London Rheumatism Department an analysis of nearly 100 cases has shown a "cure or marked improvement" in 59, "slight improvement" in 21, "little or no improvement" in 12 (Burt). American figures give much the same results. The great importance of early treatment is shown by an analysis by Dr Kalmeter of Stockholm, of a large number of patients in whom the restoration to work was related to the period elapsing between the onset of symptoms and the beginning of treatment—

Elapse of one year	79 per cent restored
Elapse of two years	56 per cent restored
Elapse of three years	50 per cent restored

Figures like these must be accepted with considerable reserve. And yet bearing in mind that, as already stated, the nation pays—at a cautious estimate—some £25,000,000 a year on account of rheumatic disease, it is clear that quite a large expenditure on Rheumatism Centres would prove a good investment. The machinery necessary should be constructed on the following lines:

(1) *SPECIALIZED TREATMENT CENTRES*—These should be established on a regional basis. To each would be assigned the giving of advice to and supervising the Local Treatment Centres within its area.

The *functions* of (1) would be the diagnosis and treatment of cases, both in- and out-patient, referred to it by a Local Treatment Centre or by a Hospital or by a practitioner; education of the patient as to methods of "self-help" and of "home therapy"; the provision of all methods of treatment accepted in current practice, the investigation of new methods of treatment referred to it from an competent source, the holding of post-graduate courses of instruction in relation to rheumatic disease, the provision of visits by consultant specialists to Local Treatment Centres, the training of workers in massage and other auxiliary service in coordination with the Chartered Society of Massage and other accredited organizations, cooperation in research with other Specialized Treatment Centres.

The *desiderata* of (1) would be the facilities it would afford for enrolling a full staff of consultant specialists—physicians and orthopaedic surgeons—with the ready help of dentists, gynaecologists, otorhinolaryngologists, pathologists and radiologists, in- and out-patient accommodation, association with a University Medical School, a fully-equipped and staffed laboratory, an efficient X-ray department, an auxiliary staff of workers in every branch of physical therapy and specially trained nurses.

here should be little need of new construction in building; the necessary action should be arranged with existing institutions so far as possible. The centre envisaged is a unit, not a building. Some ten to fifteen of these special-centres would cover England, Scotland, Wales and Northern Ireland.

ii) **LOCAL TREATMENT CENTRES**—These should be established in every town having a Specialized Treatment Centre and should be in sufficient number, so placed in accessible places, as to afford the necessary treatment facilities for patients. The equipment should be arranged for from 50 to 250 patients, and should provide for massage and remedial exercises and for the simpler forms of heat and electrical treatment. The sites chosen should be existing hospitals, pit-head baths, public baths and industrial welfare establishments. These local centres would be arranged for out-patients only. There should be a medical supervisor who is not necessarily a whole-time officer, though he might, on advantage, and where the lay-out of these Local Centres admit, share his time between two or more centres. It is, of course, important that every practitioner in charge of a Local Centre should have special knowledge of the diagnosis and treatment of rheumatic disease. He will probably have attended a postgraduate course at one of the Specialized Treatment Centres and will keep in close touch with his own Specialized Centre throughout. An auxiliary staff for carrying out physical treatment would be organized by the medical supervisor under guidance of the Specialized Treatment Centre. This staff would be recruited from graduates of the Chartered Society, and one at least should have taken the special diploma of that Society in hydrotherapy. The head of this staff should be a State registered nurse. To one member of the auxiliary staff would fall the duty of keeping the records and a standard form should be agreed by the National Health Authority.

Patients at Local Centres would be accepted only on the recommendation of their doctors, under whose care they would still remain in principle, though the decision as to the choice of physical treatments for their rheumatism would lie in the hands of the medical officer in charge of the Centre.

To the "self-help" and "home therapy" principles expression would be given at Local Centres as well as at Special Centres, and the medical officer should train himself to be proficient in advising on conditions of living—nursing, diet, clothing and habits generally—conducive to the avoidance of rheumatic tendencies.

CONCLUSION

The plan here outlined follows closely upon that framed by the Empire Rheumatism Council acting upon the suggestions of its medical advisory committee. Rheumatic disease is the last of the greatly prevalent national scourges to be left almost wholly to voluntary effort and is, in fact, largely neglected. Considerations of humanity, of national safety and of true economy, plead for some concerted effort to check its toll of pain and disablement. The plan outlined does not absolve the citizen from his duty to keep himself fit mainly by his own efforts, nor does it suggest that the State should try to live the citizen's life for him. What it does do is to plan for the establishment, on a national basis, of a special health service by means of which the present valuable but scattered and detached facilities for the treatment of rheumatic disease may be made easily available for all sufferers.

to every parent. Even cases of coccydynia are sometimes symbolically determined, and this is hardly surprising when it is realized how the tail of an animal is an organ of emotional expression! Because of the association of resentment with pseudo-rheumatism it is sometimes useful in cases of "neuritis" of the arms to try and discover whom or what it is that the patient wants to fight and in cases of "sciatica" whom or what it is that he feels like kicking.

Another interesting clinical observation is the preponderance of psychoneurotic pains and stiffness on the left side compared to the right. This again is associated with primitive symbolism. In dreams and in mythology the left, or sinister, side is especially associated with the emotions (as well as with feelings of magic, femaleness, inferiority and evil, in contrast to the right side which is especially associated with conscious control, as well as with feelings of maleness, of superiority, of power and of moral righteousness. Biblical phrases such as "the Lord's right hand", "the sheep on the right, the goats on the left," are ultimately derived from these primitive left-right feelings. (For further discussion see Halliday, 1937 and 1938.)

Psychiatrists usually allocate patients with psychoneurotic bodily disturbances into one of three groups—hysteria, anxiety state, or depression. But these reactions tend to overlap, and as manifestations of each may be found simultaneously in the same person, it is more convenient to indicate the nature of "psychoneurotic rheumatism" from the standpoint of the practitioner by describing certain types of person and of life situation commonly associated with it.

PERSONALITY TYPES *Pure hysteria*—Pain with no organic basis is probably the most frequent single symptom of hysterical reaction. In such cases the patient's countenance is pathologically free from anxiety and the expression may be detached, smiling, pleasant, or saint-like—which seems rather anomalous when an attempt is made to relate this to the history of continuous excruciating pain. When the locus of complaint is touched or handled the patient may grimace, scream, yell and struggle—a finding which again seems disproportionate. Sometimes there is a complaint of loss of power, and if a suggestion is made to the patient that this is of importance, an hysterical paresis may readily develop. In a number of these cases it is sometimes easy to induce an area of sensory anaesthesia by using a pin and repeating to the patient "You don't feel that, do you?" But, as the patient readily accepts this new symptom as a further proof that he is ill and requires attention, it is much easier to induce the anaesthesia than to remove it. In many cases of "hysteria-simulating rheumatism" a marled thudding of the aorta may be felt in the epigastrium.

Nearly all practitioners at one time or another have fallen for these patients, many of whom are very attractive, likeable, plausible, and "nice." Pure hysteria is found not only in the female with a histrionic personality, but occurs in males, especially in men engaged in dangerous occupations, such as coal-mining, working at heights (as steel erectors, steeplyjacks, slaters, window-cleaners) and working in explosive factories. Service with the armed Forces may also be classed as a dangerous occupation (Halliday, 1943a). Hysterical pain also is not rare in professional and amateur sportsmen, following an injury either to the body or more commonly to their self-esteem, and it also occurs not infrequently in persons who have undergone an intensive religious conversion. In all these cases there is

an element of purpose in the illness—an unconscious desire to avoid an awkward situation, to receive attention and sympathy, or to be interesting at all costs even to the extent of being willing to endure multiple surgical operations. The poet Coleridge suffered from rheumatism which was probably hysterical in nature, and his biographer (Fausset, 1924) notes how he “showed great discretion in his choice of households in which to fall ill.” These patients love and enjoy all kinds of physical therapy and, although they usually say that it does them good, many obstinately refuse to admit recovery. If the treatment once started is stopped, or the patient is threatened with termination of incapacity, he or she may be painfully astonished, tearful, or even openly abusive, and may retaliate by developing a different symptom or by attending another practitioner who is often an unorthodox healer and at whose hands he may experience a miraculous cure.

I remember a Salvation Army officer with hysterical pseudo-appendix pain. I suggested to him that there was no organic basis for the pain but he resisted this and became very huffy indeed. Two days later I received from him a letter stating that the night following my interview “the Lord had cured him.”

The whining, resentful person—This is the type of person who keeps on saying “it doesn’t pay me to be ill, doctor,” or, “I was never the one to give in.” Stiff necks and backs are common symptoms. Prison medical officers are not unfamiliar with this type of neuritis or lumbago.

The person who has had a hard time—This is usually a woman with many domestic responsibilities (family liabilities, financial difficulties), and often herself going out to work. She is usually strained and anxious looking, and has a queer hard determined look in her eyes. Although it is evident that she requires a “let-up” in the form of a rest or a holiday, her anxiety either prevents her taking it, or if she does leave home she cannot relax because of her worry about how they are getting on at home.

Change of occupation person—Pains and stiffness may develop when a person is compelled by circumstances to change his occupation, especially if he feels that it is inferior to his old work or to his abilities. Disappointment over promotion comes under this heading because the patient in fantasy pictures himself in a better position and, when it does not materialize, the continuation in his old situation is psychologically equivalent to a degradation of employment. Psychoneurotic rheumatism in persons who had good situations in civilian life and are compelled to join the Services in an inferior capacity might also be considered under this group.

Persons suffering from loss of the love object—This is typically seen following bereavement and is common in widows and widowers and in married persons who are estranged or separated, whether through disagreement, by long illness, or by distance of land and sea. A rather typical shoulder neuritis is not infrequent in this group. The pain is confined to an area over the outer two-thirds of the shoulder and the upper third of the upper arm. An intractable pain between the scapulæ is not unknown in widows who are compelled to take up employment after the loss of their husbands. Under this heading, also, might be placed the pains of those who have been jilted or disappointed in love. In these cases the reason for the particular locus of the pain may usually be interpreted in terms of inferiority, identification or symbolism.

The lonely person — Under this heading may be placed the rheumatism of persons who live alone in the physical sense (e g elderly spinsters), or in the psychological sense. The latter are of a cold, reserved, proud or melancholy disposition who, in virtue of their personality "keeping themselves to themselves," have never been able to communicate adequately with their fellow-beings. Certain intellectuals fall into this group.

The poor-stuff person — These persons present a problem. Mentally and physically they seem to be poor stuff, and because in youth they were never trained to an employment suitable to their low working potential it is difficult to know how to dispose of them.

The remaining two items properly belong to the next section which deals with fibrositis but they are included in this inventory for the sake of convenience.

The "desperate calamity" person — Under this heading may be placed those persons (fortunately relatively rare) who have undergone a series of intense and desperate personal calamities. They usually suffer from pains from the "crown of their head to the soles of their feet." I remember one man with this affliction whose wife was in an asylum, whose son was in prison, whose older daughter had got into trouble, and whose younger daughter had been killed in an accident. Like Job, who experienced desperate calamities and psychosomatic sequelæ, these people have usually been upright, somewhat self-righteous persons, and it is interesting to note that in some of them a generalized dermatitis may take the place of generalized rheumatism. [The Book of Job is an interesting introduction to psychosomatic medicine. It enumerates a great variety of the bodily disturbances that follow upon an intensive emotional reaction to a disturbed life situation. From the psychiatric viewpoint of Jung it is worthy of remark that Job did not recover until he had come into contact with the archaic levels of the unconscious. After encountering in fantasy the phallic monsters of Behemoth and Leviathan and experiencing the whirlwind of the spirit his personality was, so to speak, reintegrated and concomitantly his somatic disorders resolved.]

The self-important, self-opinionated person — Under this heading are the bossy, self-opinionated, often obviously aggressive persons, who must be important at all costs. They use their attacks of rheumatism as a means of increasing their self-importance, and magnify themselves by telling everyone about it. Many of them derive considerable benefit from short courses of massage and they make a fairly quick recovery—until the next time. Their super-importance is based on an underlying need for dependence, and when from time to time their deep-seated dependent tendencies cry out for gratification this can be temporarily secured through massage, and usually more effectively if the individual carrying it out is a member of the opposite sex. If the person suffering from this kind of rheumatism happens to be a medical man, he is likely to be an ardent believer in fibrositis, find nodules everywhere, and prescribe massage or physical therapy to such an extent that he becomes the main support of the nearest massage and electrotherapeutic establishment.

PSYCHOSOMATIC MEDICINE AND THE PROBLEM OF FIBROSITIS
The name "fibrositis," a word that has a primary reference to a pathological alteration in fibrous tissue, is now applied so widely and so loosely that it is cease-

to be a term of scientific value. As alterations in fibrous tissue may be a response to different kinds of external agents, each provoking different types of changes in function and in structure, an analogy to its present-day use would be the employment of the word "pulmonitis" as a satisfactory diagnosis for cases of pneumonia, tuberculosis, asthma, bronchitis and even hydatid cyst. The unsuitability of the unqualified term becomes obvious when it is remembered that it has been applied, *inter alia*, to alterations in fibrous tissue (a) following trauma from the application of external force, (b) following sprain resulting from the operation of abnormal muscle pulls, (c) associated with acute infective disease, as in scarlet fever or tonsillitis, (d) associated with complaints of pain and stiffness in patients who happen also to have a chronic septic focus, (e) associated with reaction to heat, cold, wet or draughts, (f) associated with fibro-fatty changes, either general or localized, (g) in rheumatoid arthritis. Yet each one of these examples of "fibrositis" has a distinctive etiology, a distinctive clinical course, and also presumably a distinctive pathological picture.

Because of these confusions some observers, especially in America where the word is seldom used, have questioned the value of the term and have expressed doubt if fibrositis exists "as a clinical entity" (Hench, 1937, 1939). From the psychosomatic point of view two basic questions require an answer—(a) What is the natural history of each of the various affections in which alterations in fibrous tissue occur?, and (b) what is the part played by the emotions in cases of "true fibrositis"? (The prefix "true" was introduced by physicians who were aware of the need for more accuracy in the use of the word.) For example—

(a) What is the normal duration of lumbago or sciatica when these are presumably associated with internal muscular pulls or with exposure to cold or damp? There is little information available on this point. According to Hurst (1942) patients with genuine sciatica and lumbago usually recover within two or three weeks if given rest, if the pain persists after that "it is almost always a result of a hysterical perpetuation of what had been originally determined by organic changes." Again, what is the normal duration of complaints of pain and stiffness following trauma? The answer to this will obviously take into account the degree and locality of the trauma, but it seems unlikely that pain from this cause should continue over months and years. If it does, the matter seems primarily to be one for the orthopaedic surgeon who, if unable to find anything mechanically relevant is—or should be—aware that psychology rather than rheumatology is more likely to throw light on the nature and etiology of the complaint.

(b) Workers who have been subjected to cold and wet surroundings or to draughty places of occupation may continue to work without symptoms over a period of many years, and if they do report sick with complaints of pain and stiffness it is usually at a time of some emotional disturbance concerning domestic, financial or occupational problems. These emotional upsets are often associated with inward feelings of resentment, but the patient has repressed these and blames the cold, heat or wet, i.e., he rationalizes these physical factors for the sake of personal or purposive ends. This does not necessarily mean that there may not be a physical basis for the complaints. If reactions of pain and stiffness to wet, heat and cold are, as some writers have supposed, of an "allergic" nature, it might be inferred that emotional upset lowers the threshold of sensitiveness to these external physical agents. (There is an analogy here to certain cases of asthma.)

True fibrositis—A fairly distinctive type of fibrositis seems to occur in persons of a particular kind. In such individuals there is not necessarily any history of trauma or of exposure to heat or cold but it is noteworthy that many give a medical history of previous psychosomatic illnesses, such as duodenal ulcer, effort syndrome, high blood pressure or "bronchitis," and that onset of their rheumatism follows a period of upset, stress or nervous strain. Other members of the family

may have a similar repertory of disease—a finding which suggests that there may be also a constitutional or genetic element. Most of these patients show a definite type of personality, i.e., they are over-active, over-efficient and over-independent, but are unduly sensitive to threats of security, whether in relation to business anxieties, financial uncertainties or domestic worries. In short, they show characteristics of the “ulcer personality.” A sub-group of this personality type comprise those who are unduly self-important and self-opinionated as described in the inventory in the last section. Concerning somatic mechanisms, it has been surmised that emotional upset induces vasomotor changes which bring about localized areas of ischæmia which are responsible for the symptoms. This theory would account for the beneficial results of procaine injections in many of these cases, the anaesthesia presumably breaking a vicious circle. Massage in its physical as distinguished from its psychological aspects (Halliday, 1941b) may perhaps be effective by restoring local circulation or by relieving cramps of muscle fibres.

Somewhat similar considerations probably apply to many cases of fibro-fatty thickening in women, and it is possible that organic changes of this nature are mediated through alterations in the activity of the autonomic and endocrine systems associated with emotional stress. Study of the natural history of these affection shows how often the rheumatism appears at a time of upset and strain, and that when the external circumstances are relieved, or alternatively, when the patient can be induced to feel differently about his or her life situation, the fibrositis or peri-arthritis thickenings may disappear—“almost as by magic” as Ray (1927) put it. (See also Halliday, 1941a.)

To conclude, the problem of fibrositis has been created at least in part by the indiscriminate application of a disease name and by its employment as a substitute for a diagnosis that is based on etiological comprehension. The problem of true fibrositis is still unsolved but, as in many instances its onset or recurrence is precipitated by emotional upset and is alleviated when the life situation improves, the methods of psychosomatic medicine are required for its study, whether in respect of examination, treatment, research or prevention.

PSYCHOSOMATIC MEDICINE AND RHEUMATOID ARTHRITIS

The first point which strikes the medical psychologist who investigates a series of patients with rheumatoid arthritis is the contrast between the relative frequency of a positive family history (20 to 30 per cent), and the relative infrequency of the affection in the community. This suggests that the etiological significance of a genetically inherited predisposition may be considerable. (Rheumatologists who see numerous cases of rheumatoid arthritis at a treatment centre may object to the statement that it is a “relatively infrequent affection,” but the morbidity statistics of the insured population in Scotland show that this is so. For example, in the annual period July 1935 to June 1936, of the 378,207 cases of incapacity only 330, i.e., 0.07 per cent, were attributed to rheumatoid arthritis. This figure is certainly an underestimate because a number of cases of incapacity due to rheumatoid arthritis are hidden under the vague term of “rheumatism”, but even if it were multiplied a number of times the finding of a 20 to 30 per cent family history in a series of cases is worthy of emphasis and of interpretation.)

The specific contributions of a psychological approach to the problem of rheumatoid arthritis are most conveniently arranged under the headings of the various questions of etiology that are applicable to the study of all disorders in terms of any technique of approach (Halliday, 1943b)

(1) *What kind of person develops rheumatoid arthritis?*—A typical rheumatoid personality shows marked emotional self-restriction, i e, instead of liberating her feelings and emotions freely, she tends, so to speak, to bottle them up rather than express them outwardly. This restriction is physically obvious in the relative limitation of facial expression which in these patients may be described by terms such as complacent, or as mildly pleasant with limited little smiles, or as lacking the play of feeling. It is also revealed by the behaviour or manner, which is calm, quiet, and singularly wanting in fidgetiness or aggression. Rheumatoid patients have also a highly developed sense of duty, and their tendencies to self-restriction may include those of self-sacrifice, which makes them accept responsibilities and undertake tasks beyond all reason. This is revealed in the often-described story of how they continue to tend or nurse aged relatives, how they keep on at work even when no one, in view of the obvious physical changes in their joints, would expect them to do so, and how they will give up a friendship or continue to live in a house much too large for them because of their strong compulsive feelings of duty to some person or some idea. In addition, they show marked obsessional trends in the sense that they are unduly orderly, or punctual, or tidy, or dirt conscious, or particular about detail. In other words, they are fixed in their ways and set in their ideas. It is noteworthy too that these characteristics antedate the onset of the arthritis and, indeed, seem to have been present from the earliest years (Halliday, 1942)

(2) *Why does she take rheumatoid arthritis when she does?* (i e, to what environmental factor, if any, is the rheumatism a response?) It has long been known that rheumatoid arthritis may be precipitated, or may recur, as a response to some disturbing or upsetting event or life situation, and a recent investigation of a controlled series of cases (Cobb, Bauer, and Whiting, 1939) confirms that "emotional stress" must be regarded as etiologically significant. But every person with rheumatoid arthritis does not provide a history of a clear-cut precipitating event, and in such instances the illness must be regarded as an outward manifestation of the total psychosomatic personality. (It would be interesting to know if there is any difference in the prognosis between reactive and non-reactive cases.)

(3) *Why does she take ill in the manner she does?* (i e, why does she develop rheumatoid arthritis?) This question deals with the somatic and psychological mechanisms which underlie the outward manifestation. The physical mechanisms immediately responsible are surmised to include disturbance of the endocrine and the autonomic nervous systems, which in turn bring about vascular changes which affect local metabolism (Hench, 1936). From the psychosomatic viewpoint it may be surmised that there is an inherited predisposition to rheumatoid arthritis, and that this may be regarded as having both physical and psychological aspects, i e, a predisposition to develop a particular somatic pattern is combined with a predisposition to develop a particular personality pattern. When the individual encounters disturbing circumstances, the emotional tensions thereby engendered are unable (because of self-restriction) to secure external liberation. As the

bottling-up process continues, the energy of the unliberated emotions accumulates until, if it reaches a critical level, it sparks over, so to speak, and releases into manifestation the latent inherited somatic predisposition. Individuals with the rheumatoid predisposition, however, need not necessarily develop the disease. Whether they do so will depend very much on their psychological surroundings, the tendency to somatic manifestation being enhanced if during childhood the parental influences have been inappropriate or if, in later years, they meet—or because of the trends of their personality actually bring about—an excess of frustrating situations.

(4) *Why does she get better when she does?* (this involves the etiology of natural recovery) —Rheumatoid arthritis is a phasic disorder, and the process once begun does not necessarily, even in the total absence of treatment, progress to a final state of crippling. The ameliorating influence of the removal of a cramping life situation, or the interposition of a new interest in the life of the patient, giving her something to live for, has been noted in individual cases. The problem of natural recovery, however, has not yet been studied in an adequate way, neither has the effect of adding psychotherapy to methods of physical treatment.

(5) *What is the purpose of the illness?* (this is the question of telology). In contrast to "psychoneurotic rheumatism," especially in its hysterical form, rheumatoid arthritis, so far as is known, seems to serve no purpose in the life of the patient who achieves no secondary gain by being ill.

Lastly, to prevent any misunderstanding, it may be emphasized that a psychic somatic theory of rheumatoid arthritis accepts that external physical events (such as chill, trauma, unsuitable diet, or micro-organic invasion) may be causally related to the disorder, but it suggests that in view of the results obtained by applying a psychological approach it would seem that these other factors should often be regarded as secondary, occasional or contributory. No final assessment of the relevance of the various causal factors is at present possible. Important basic data, such as those concerning incidence, are lacking and as these are required for the testing of any causal theory against the etiological "principle of the prevalence," the causes of rheumatoid arthritis cannot yet be formulated in any exact sense.

NOTES ON ACUTE RHEUMATISM AND OSTEOARTHRITIS

Acute rheumatism —A positive family history of acute rheumatism is obtained so often from patients that a genetically inherited predisposition has been postulated. Associated with this there may also be a fairly typical personality pattern which, according to Hubble (1943) shows as outstanding characteristics an over-average intelligence, hyperkinesis and hyper-emotionalism, the last appearing either openly or in the suppressed form of unusual sensitiveness and shyness. Emotionally disturbing external events and life situations have been noted to precipitate the onset or recurrence in individual cases. Environment in its psychological aspects is, however, probably less important etiologically than environment in its physical and more especially in its micro-organic aspects. This is suggested by the facts of the prevalence, which show that during the last thirty years the incidence of rheumatic fever declined steadily. During that time environ-

ment in its psychological aspects steadily deteriorated as exemplified by increasing unemployment and the extension of the dole system. If acute rheumatism had been related primarily to such factors, a rising trend would have been expected. On the other hand, during the same period the physical and micro-organic environment of school-children—and the maximum incidence of acute rheumatism is during the school years—was steadily improving, e.g., progressive advances in hygiene and in methods of school construction, better clothing, extension of feeding arrangements, and last (but probably not least) a lessening virulence of streptococcal invaders as revealed in the concomitant declining death rate from scarlet fever and erysipelas. The complex etiology of acute rheumatism will not, however, receive adequate formulation until sufficient facts have been collected, arranged, and interpreted in accordance with the basic principles of etiological science.

Osteoarthritis—The etiological relevance of the emotions, especially of repressed rage, hostility and resentment, has been observed in a number of individual cases by Jelliffe (1936), who suggested that psychotherapy designed to alleviate these inner tensions would be of therapeutic benefit. No controlled investigation, however, appears to have been made to determine the part played by "the emotions" in the total etiological picture.

CONCLUSION

The contributions of psychosomatic medicine to the rheumatism problem have many important practical implications but these cannot be discussed here. A primary implication may be mentioned, viz the need for all interested in the rheumatism problem to become acquainted with, and to practise, the psychosomatic viewpoint by employing a simple psychological investigation as a routine supplement to clinical and laboratory examinations. By so doing observations relevant to many aspects of rheumatics may be made and guidance obtained for the purposes of treatment and prevention which, because it is based on demonstrable etiological factors, is likely to prove of value. Unfortunately, it seems that for many medical men (to quote the words of F. G. Crookshank, 1924) "it is easier to ignore what *can* be observed than to renounce what has been asserted."

References

- Cobb, S., Bauer, W., and Whiting, I. (1939) *J Amer med Ass*, **113**, 668.
 Crookshank, F. G. (1924) "The Mongol in our Midst," London, 5.
 Ellman, P., Savage, O. H., Wittkower, E., and Rodger, T. F. (1942) *Ann Rheum Dis*, **3**, 56.
 Fausset, H. l'A. (1924) "Samuel Taylor Coleridge," **138**, 200, 205, 231, 251.
 Jelliffe, S. E. (1936) *Amer J Psychol*, **92**, 1051.
 Halliday, J. L. (1937) *Brit med J*, **1**, 213, 264.
 — (1938) *Proc roy Soc Med*, **22**, 167.
 — (1941a) *Ann int Med*, **15**, 666.
 — (1941b) *Arch Phys Ther*, **22**, 261.
 — (1942) *Proc roy Soc Med*, **35**, 455.
 — (1943a) *Psychosom Med*, **5**, 71.
 — (1943b) *Brit J med Psychol*, **19**, 367.
 Hench, P. S. (1936) "Reports on Rheumatic Diseases," London, 180.
 — (1937) "Fifth Rheumatism Report," London, 1330.
 — (1939) "Seventh Rheumatism Report," London, 1660.
 Hubble, D. (1943) *Brit med J*, **1**, 121, 134.
 Hurst, A. (1942) Personal Communication (quoted by Ellman).
 Ray, M. B. (1927) "Rheumatic Diseases," London, 43, 64, 69.

REHABILITATION IN RHEUMATISM

By C B HEALD, CBE, MD, FRCP

*Physician in charge of Physical Medicine Department, Royal Free Hospital, Physician,
British Red Cross Clinic for Rheumatic Diseases, Consultant in Physical Medicine,
Royal Air Force*

REHABILITATION is perhaps the most dangerous word that has been introduced into medicine in the last hundred years. It has already become a slogan of politicians and there is a danger of it being exploited by job-seeking medical men. It may mean one thing to one group, whilst at the same time meaning something quite different to another.

Orthopædic surgeons have written demanding that rehabilitation centres should always be under the control of orthopædists, other branches have pointed out that this supposedly new subject has its ramifications in all sections of medicine.

A little more than one hundred years ago during an epidemic, probably of influenza, the word "febricula" was introduced, i.e. "a diminutive fever." It meant nothing, but it soon became a satisfying diagnosis to the patient and to the attending medical practitioner. But as the result of the introduction of this word, and as a direct result of the self-satisfaction it produced, investigation of the true cause of the so-called "febriculas" was deferred many years. To-day the word "lumbago" is still able to satisfy some patients and some practitioners, yet it is as meaningless as febricula and therefore in no way a basic or fundamental diagnosis.

It is necessary at all costs to avoid falling into the same error about this word rehabilitation and, since it is apparently too late to kill the word, it is well to attempt some temporary working definition.

DEFINITION OF REHABILITATION

Chambers' dictionary defines rehabilitation as "the act of restoring to forfeited rights or privileges." If therefore this definition is accepted as correct and the forfeited rights and privileges are regarded as "wellness" of body and of mind it is clear that rehabilitation begins at the first attendance of the practitioner, ever if his first acts are tourniquet, artificial respiration and blood transfusion. Rehabilitation must therefore ensure a comprehensive approach to the patient, from the aspects of diagnosis and treatment. In rheumatism, possibly more than in any other ailment, treatment must cover a balanced consideration of all problems, whether *domestic, climatic, mental, occupational or mechanical*. These considerations must be kept in mind at all stages of the disease, and appropriate treatment, both immediate and long range, secured so far as possible. It is now possible to present the problem of rehabilitation in rheumatism in some sort of logical order.

DIAGNOSIS

Rheumatism is just as bad a word as rehabilitation or lumbago, but (until it is sorted out by research) it requires a definition to serve as a working guide. The best definition so far evolved is that proposed by the Heberden Society, namely "painful disorders of joints and muscles with their tendons and fasciæ for

which there is no adequate explanation" It is obviously essential to recognize that "rheumatoid arthritis," "osteoarthritis," "infective arthritis," "lumbago," "sciatica," "fibrositis," and many similar terms employed in rheumatology are no more diagnoses than the old harmful "febricula" was a diagnosis

If, however, the case sheet is headed "arthritis—infective—gonococcal," a diagnosis has been made or, at least a statement, that calls for certain action stations But "infective arthritis" without qualification too often leads to gloom and pessimism and permits the condonation of purely palliative procedures

"Lumbago—? gouty—? tonsils—?" this is totally different from "lumbago" which merely means, in another language, exactly the same as the patient's first complaint, namely an ache in the back

It is well therefore to start rehabilitation with the initial stimulus, either by an accurate diagnosis at the first examination (rarely possible) or a statement that will help to lead to an accurate diagnosis

ENVIRONMENT

This is put foremost in the problem of rehabilitation, because it is the soil in which the diseased plant is growing Too many medical men on hospital staffs consider that this field should be left to the almoners, but the almoner is only the medical auxiliary just as is the masseur or radiographer She is the investigator and reporter—and in these capacities plays an invaluable part She should primarily be the medical auxiliary, on the domestic side, of the practitioner, and quite secondarily the collector of money Her reports to the medical practitioner should include such important factors as the patient's food and how it is prepared in the home The "tin" and "ready cooked food" patient is instantly handicapped in rehabilitation in comparison with the "all home cooked and not a tin in the place" patient. Housing conditions, finance, home and business worries, hours of work, journeys to work, opportunities for rest, hobbies and games will all figure in her reports These are vital in rehabilitation, whether among the almoner's class of patient or those in higher social scales

CLIMATIC INFLUENCES

Far too little is understood and known about climatic influences As a general guide, gouty and hæmolytic streptococcal arthritic patients appear to do less well by the seaside than when living at a height on gravel away from the sea Arthritis in women of child-bearing age and without apparent causal factor does well by the sea

An essential part of rehabilitation in rheumatism therefore is to consider the question of whether a temporary or permanent climatic change is essential For example, the patient with high blood uric acid does well as a rule in the tropics where a patient with high blood sedimentation rate would rapidly deteriorate

MENTAL ATTITUDE

In a high percentage of rheumatic and arthritic cases the mental approach of the patient to his or her condition is of fundamental importance if rehabilitation is to be effective. This is not a matter to be handed over to the almoner; it is an

intimate concern of the practitioner that should always be present in his mind each case being obviously a problem in itself.

OCCUPATIONAL OR MECHANICAL

This aspect of rheumatism provides one of the most fertile fields in which the combined rehabilitation can produce satisfying results, but not without the our factors as briefly dealt with above. At this point it is necessary to divide the patient into two groups—(a) Those predominantly requiring rest (b) those requiring progressive movement—broadly speaking the ambulatory cases.

Each of these groups—an accurate basic diagnosis being presumed to have been achieved—requires consideration from the aspects of—

- (A) Physical treatment.
- (B) Occupation, occupational therapy (including replacements in industry and possibly learning a new trade).
- (C) Exercise and rest.
- (D) Food input and output.
- (E) Drug treatment.

PATIENTS PREDOMINANTLY REQUIRING REST

In this group come all those with high blood sedimentation rate and acutely active joints. Acute conditions, such as accompany sudden attacks of pain in back and legs, the so-called acute lumbagos and sciaticas, acute pains in other nerve and muscle groups also call predominantly for rest.

It is not possible within the scope of this article, this special number or indeed any book to give instructions for the rehabilitation of this group. It will be more helpful to consider the second or ambulatory group. Before, however, leaving consideration of this group one vital point must be made, namely, that unless rehabilitation is started during the acute stages prognosis is invariably worse, and for this no one but the practitioner is to blame, even when the patient is in the humblest home.

AMBULATORY GROUP

(A) **PHYSICAL TREATMENT.**—The choice of physical treatment should be based on a true conception of the existing physical state that it is wished to alter. There are some of the questions which arise in cases of rheumatism with one possible answer to each—

- (a) Is there effusion of lymph that needs removal? Then use the direct current.
- (b) Is there an insufficiency of ovarian hormone? Then use histamine ionisation.
- (c) Is there lack of blood supply? Then use short wave.
- (d) Is there insufficiency of excretion by the skin? Then use brine or Wilde's baths to secure sweating with slightly raised temperature.
- (e) Is there muscle atrophy? Then use a faradic type of current.

These are sufficient examples of this method of approach to the selection of physical treatments.

(2) *OCCUPATION, OCCUPATIONAL THERAPY, AND REPLACEMENT IN INDUSTRY*—Consideration of how far an existing occupation is harmful, and the question of replacement in industry are obviously questions that can only be dealt with separately for each patient under certain guiding principles, such as "the higher the *blood uric acid* the warmer and 'sweatier' the conditions of work the better," but "the higher—even as a past event—the *blood sedimentation rate* the more equable, the more varied, and the less fatiguing the work the better." Another useful rule is that infected joint surfaces respond badly to work which compresses the surfaces intermittently, as do most high-speed tools, and well to jobs that give light short duration traction.

Again patients whose hæmoglobin is below 80 per cent, even if their blood sedimentation rate is normal or nearly normal, do badly with any type of work that involves long standing.

Occupational therapy—Many chapters might be written on this but despite the claims put out by many occupational therapists about it being essential to study each missing movement and that it is necessary to select work that does not allow a missing movement to be camouflaged, it can be stated emphatically that the best occupational therapy is the one that intrigues the mind and appeals now, or in the future, to the pocket. If these principles and, secondarily, lost individual movements be kept in mind when selecting occupational or vocational treatment, success will follow; whereas if forgotten boredom will soon appear.

(3) *Exercise and rest*—All practitioners are being constantly asked by rheumatic patients—"What exercise can I take" or "How much can I do." Difficult as this question is to answer in arthritic cases there is one good general rule that seldom lets the practitioner down. Exercise in cases with present or past raised blood sedimentation rates "should be little and often" and "if the exercise you have done to-day is done less easily to-morrow you have done too much, but if done more easily you may gradually add to it." This also applies to pain after exercise, especially at night.

(4) and (5) *Food and drugs*—The input and output of food, its adequacy and sufficiency, is vital to rehabilitation, as may be drugs such as thyroid and ovarian extracts in menopausal rheumatism, but they are only mentioned here to ensure that wide conception of rehabilitation that is so necessary to success, and to avoid the all too frequent habit of referring the patients for a course of massage and electrical treatments.

SUMMARY

(1) The dangers of the new word "rehabilitation" are discussed and the necessity of realizing that it begins with the onset of the ailment and is not a new or isolated method of treatment, is emphasized.

(2) The importance of recognizing that rheumatism, lumbago, and similar terms used in rheumatology are not diagnoses, and that good rehabilitation is impossible without a basic diagnosis, is insisted upon.

(3) The physical, domestic, climatic, mental and occupational aspects of rehabilitation in relation to rheumatism are dealt with in principle.

THE MANAGEMENT OF EARLY RHEUMATOID ARTHRITIS

By FRANCIS BACH, D M

*Assistant Medical Officer in charge of Electrotherapy Department, St Thomas's Hospital,
Consultant in Rheumatic Diseases to the London County Council*

THE study of rheumatic diseases involves difficult and obscure problems. For the purpose of diagnosis, treatment and research certain generally recognized forms of rheumatism should be defined and clearly differentiated from each other. The four main clinical and pathological forms which should be recognized are.—rheumatic fever, the rheumatoid type of arthritis, the osteoarthritic type and non-articular rheumatism or fibrositis.

It is important for medical practitioners to realize that although these forms of rheumatism are differentiated, it is the sick man and not the disease process that they are called upon to treat. People react in different ways to similar extraneous stimuli. In the causation of disease there are both extrinsic and intrinsic etiological factors. Bauer has stressed the fact that the resistance of the individual is inversely proportionate to individual predisposition. Predisposition is not an individual entity, but a product of structural and functional components of the individual, both constitutional and environmental in character. Constitutional, biological inferiority, poverty, malnutrition and occupation Bauer considers as some of these components. They determine whether or not a disease may result from the action of a seemingly insignificant and slow-acting injurious agent. They are responsible for the individual differences in the clinical picture and course of a disease, such as the localization of the foreign agent in the body, the different defence mechanisms brought into action by the infected organism and its variable recuperative power.

The rheumatoid type of arthritis is not the most prevalent rheumatic condition seen in medical practice, but it produces a greater amount of crippling and more need for early institutional treatment than any other form. It is essentially a disease affecting the young adult and is somewhat more common in young women than in young men. It is a constitutional or systemic disorder of undetermined origin, characterized by inflammation of articular and peri-articular tissues leading, if not arrested, to atrophic ankylosis and deformity. There is evidence that infection plays an important part in its causation. In clinical practice the gonococcus or the tubercle bacillus may occasionally be identified as the infecting organism. In Still's disease, or the rheumatoid arthritis of childhood, the streptococcus appears to play a causative rôle, but in the majority of cases no definite infecting organism can be detected.

CLINICAL PICTURE

To treat the disease it is necessary to understand something of its natural history. A small number of people gradually become crippled in spite of every medical care. In the larger number the disease becomes arrested with but little crippling, even if inadequate or no treatment is given. In the majority of patients early and adequate treatment is essential if the progress of the disease is to be arrested and

gross disability prevented. The clinical picture may manifest itself as an acute febrile polyarthritis. Usually the onset is insidious and the disease runs a course of many years with remissions and exacerbations. The common constitutional type is the overworked, tired, worried, tense, underweight slender individual of a poor posture and cold clammy hands and feet. Worry, emotional strain, overwork, sudden shock and malnutrition stand out in the carefully taken clinical history. Commonly the patient is a young woman who complains of fatigue, loss of appetite, backache and vague pains, rapid heart beat, loss of weight and, later, of transient stiffness and puffiness of one large joint, such as the wrist, knee or ankle or the proximal interphalangeal joints of the hand. Usually the correct diagnosis is not made at this stage and symptomatic treatment only is given. The local signs respond to local treatment but a few months later the patient complains, especially on waking in the morning, of aching stiffness with definite restriction of joint movement, either in one or two of the proximal interphalangeal joints, or of pain, muscle spasm and limitation of joint movement in a wrist or ankle. There is pain on movement of the joints and acute tenderness on lateral pressure on the slightly swollen, puffy interphalangeal joints. Later, muscle wasting and gross skin atrophy may appear.

DIAGNOSIS

In the early stage it may be difficult to make the diagnosis on the clinical picture alone and certain investigations may be necessary if a definite diagnosis is to be made. The differential diagnosis has to be made from a peripheral vascular disturbance, such as chilblains, the articular manifestations of rheumatic fever, of gout and gonorrhœa, of fibrositis and the Heberden's nodes of the osteoarthritic type of arthritis and also from symptoms of an anxiety state. The skiagraph of the hand shows only slight periarticular thickening. There may be increased density with an enlarged soft tissue shadow, but no bone atrophy and no loss of joint space. Only at a later stage, when osteoporosis of the epiphyses and narrowing of the cartilage space appear, can the radiologist recognize the changes as characteristic of rheumatoid arthritis. At a still later stage is a generalized decalcification of the shaft of the bone first recognizable.

The *blood picture* at this stage may give some valuable information. There may be a slight anæmia, a slight leucocytosis and increased non-filament count. The blood sedimentation rate is usually raised, even at an early stage of this condition, and is the most valuable laboratory evidence, although of a non-specific character.

As the disease progresses puffiness of the joints may change to definite periarticular swelling and joint effusion may occur, particularly in the knee joints. If untreated, finally the stage of crippling is reached, with marked stiffness of the shoulders, flexion deformity of the knees, muscle atrophy, subluxation and postural dislocation of the tibia and fibula on the femur.

SOCIAL FACTORS

In my hospital work, when the clinical diagnosis of early rheumatoid arthritis has been made the almoner prepares a detailed social report. Before admission to hospital the patient's confidence must be gained and plans for her future discussed, or if she has a fear of becoming crippled she must be reassured that this will be

front of the foot just proximal to the heads of the first metatarsal bones. Special transverse arch supports made of felt or sorbo-rubber help to relieve pressure on the sensitive joints.

DRUGS are used as part of the symptomatic treatment to relieve pain and stiffness and discomfort. Aspirin 5 grains, amidopyrine 5 grains, three times a day; or two Tab. codein. co. tablets taken on waking in the morning are of help. Phenobarbitone, $\frac{1}{4}$ of a grain three times a day, and amytal (Lilley) $1\frac{1}{2}$ grains at night, tend to diminish the effects of worry. Liniments in the form of oil of wintergreen or Scott's dressing may be applied to the painful joint. Drugs are also of use as part of the general treatment. If anæmia is present, ferrous sulphate, 5 grains after meals, should be prescribed. Liver extract in the form of hepatex or an hæmin 2 c.cm. should be given intramuscularly once a week. When achlorhydria or hypochlorhydria is present 20 minims of diluted hydrochloric acid with a spoonful of orange or tomato juice or some substitute should be taken at meal time. Insulin, 10 units, may be given 20 minutes before breakfast and lunch to stimulate appetite. If, as often happens, a *B. coli* infection of the urinary tract is present this is an indication for sulphathiazole treatment. As a routine, large doses of vitamin B and C are given in the form of benerva, 3 mgm., and ascorbic acid 50 mgm. three times a day after meals.

Endocrine disturbances are common, and often appear at the menopause. Stilb-æstrol, 1 mgm. by mouth each morning or 20,000 units intramuscularly once a week is usually prescribed as an initial dose. Gold may be of great help, but this form of treatment is indicated only if the sedimentation rate is raised. This is a non-specific treatment: gold is considered to be a reticulo-endothelial stimulant aided by this action to raise the resistance of the patient. I use myocrisin (May and Merck), starting with 0.01, 0.02, 0.05, 0.1 gm. intramuscularly at weekly intervals until 1 gm. in all has been given. In certain cases larger individual doses may be prescribed and up to 2 gm. may be given in a course of treatment. If adequate precautions are taken toxic manifestations, such as pruritus, exfoliative dermatitis, ulcers in the mouth and hæmopoietic disorders, are rare. If the patient is tired and physically exhausted on admission to hospital a slow blood transfusion of a pint of blood may be of great help. The removal of possible foci of infection is usually not indicated in the early active phase. The dental surgeon inspects the teeth of all the patients but only gross infection is treated.

DIET.—This should be of high calorie value, varied, well served and appetizing. The protein and fats should be relatively high and a reduction of carbohydrates is often advisable, as the usual diet of these patients frequently consists of bread and cakes in excess and insufficient protein. On account of the deficiency in stomach secretions and mobility, which is so frequently observed, fluid taken with meals and large quantities of "bulky" food should be avoided. The following diet sheet has been drawn up by a dietitian and allows for rationing conditions —

	C	P	F
<i>Breakfast</i> - Tea or coffee—Mill. $\frac{1}{4}$ pint	6 5	4 5	5 5
Bacon 1 oz. (1 rasher) or 1 egg—fresh or dried			
—or fish ..	—	3 5	13
Bread 3 ozs — $\frac{3}{4}$ half-inch slices	39	9	—

	Butter or margarine $\frac{1}{2}$ oz—piece size of a walnut	C	P	F
	1 apple or other fruit available	10	—	—
	Marmalade, jam or honey 1 oz—about one tablespoonful	20	—	—
Lunch	- Meat 2 oz—an average helping—or fish	—	9	12
	Potatoes 6 oz—2 average size	36	3	—
	Cabbage or other green vegetables—a good helping—Carrots or other root vegetables	5	—	—
	Milk pudding, allowing $\frac{1}{2}$ pint milk made from milk powder	6 5	5	—
	Cereal $\frac{1}{2}$ oz	12	—	—
	Bread 1 oz	13	3	—
Tea	- Tea—Milk $\frac{1}{2}$ pint	6 5	4 5	5 5
	Bread 2 oz—2 half-inch slices	26	6	—
	Butter or margarine $\frac{1}{2}$ oz—size of $\frac{1}{2}$ walnut	—	—	6
	Cake 2 oz or jam	40	—	—
Supper	- Cheese 1 oz or 1 dried egg or fish	—	7	10
	Potatoes 6 oz—2 average size	36	3	—
	Butter or margarine $\frac{1}{2}$ oz—size of $\frac{1}{2}$ walnut	—	—	6
	Bread 2 oz	26	6	—
	Salad of—Grated carrot, shredded raw cabbage Dried fruit 1 oz—when obtainable—or pudding	11 5	—	—
	Allow 1 oz of sugar each day	27	—	—
	Total	321	63	64

Caloric value of diet 2112

In addition to the above diet mineral prescriptions and vitamin concentrates are given in proportion to the need of the individual patient, but out-patients are advised, when possible, to take one main meal at a restaurant or canteen in order to preserve a larger amount of the rationed foods for home consumption. The caloric value of the diet can be increased by the addition of extra potatoes, bread, cake, or steamed puddings.

REHABILITATION

As the patient progresses, class exercises and remedial occupational therapy are added to the treatment. Arrangements are made for convalescence before the patient returns to the out-patients department and to his normal work. Occasionally a young adult is referred for a course of training to one of the industrial centres. Early symptoms of improvement are a feeling of being much better in general health with less pain and stiffness in the affected joints. Usually this is accompanied by a gain in weight, diminution in joint swelling and a fall in the sedimentation rate, and the temperature when raised returns to normal or a sub-normal level.

CONCLUSION

The successful treatment of the early and active phase of rheumatoid arthritis is dependent on close cooperation between the patient and the medical staff. The latter may consist of a team, as in the rheumatic unit, or of one man as must often happen in general practice. The aim of treatment is to help the patient to increase his or her resistance by altering some of the constitutional and environmental factors which cause ill health, and by this means to modify the clinical picture of the disease. Psychological, medical, physical and sociological measures play an important part in this achievement.

THE FUTURE OF SPA TREATMENT

By F CLAYTON, M D, F R C P

Physician, Warneford and South Warwickshire General Hospital, Leamington

THE value of physical medicine as practised at the spas has been slowly and rather grudgingly appreciated by the medical profession of Great Britain, and favourable claims made by practitioners in this branch of medicine have often had a sceptical reception. It is right and proper that this traditionally British attitude should be sustained until convincing proof is forthcoming, but the present revival of interest both in medical and non-medical circles concerning rehabilitation with all its implications has given a great stimulus to physical departments everywhere, and what was previously regarded as ancillary has now become an essential integral service in every hospital. The clinical evidence of its worth accumulated from years of empiric usage is beginning to be reinforced by research and planned experiment, thus establishing an acceptable and scientific foundation for further development. Crude biological tests are being supplemented by accurate physical measurement, and health centres and spas throughout the country will in future take their full share in helping to raise the level of the nation's health by the preventive and curative means at their disposal.

ORIGIN AND ORGANIZATION

It is now 300 years since Spa—a famous health resort in the Ardennes—gave its name to the English language. This small Belgian town, situated 820 feet above the sea, possesses an effervescent chalybeate spring which was held in great repute in Elizabethan days. Its virtues were recorded by Henrius ab Hears in a work entitled "Spadacrene," and in 1626 Dr Deane of York published "Spadacrene Anglica" or "The English Spa Fountain."

Henceforth a British Health Resort endowed with the advantages of a mineral spring became a "Spa." By comparison with the Continent, and especially with the U S S R., Great Britain makes only limited use of her resources, but those spas which operate as such are conveniently distributed throughout the land and are linked together by a well-managed federation which aims to promote the efficiency of all its members. Much progressive and coordinating work has been achieved by this body which came into being twenty years ago and which has, throughout its existence, kept in close touch with medical opinion concerning the value of hydrology and physical medicine generally.

The federation, however, by its constitution is essentially a practical association which is chiefly concerned with fostering and extending existing attractions, and which relies entirely on the medical profession for the inclusion of accepted remedies in the spa's equipment. It is thanks to the Royal Society of Medicine, the International Society of Medical Hydrology, whose activities are now of necessity in abeyance, and to other bodies that useful scientific progress has been reached and put to active use.

Spa treatment is a lively branch of physical medicine the value of which is being more and more appreciated by the profession. Convalescence of the future is to

be more exciting and chronicity discouraged. The British spas will contribute to these ideals by virtue of their equipment and natural advantages. Here in addition to the ordinary requisites of a physiotherapeutic department special provision is made for the internal and external use of the local springs.

INDICATIONS FOR SPA THERAPY

Spa treatment is a comprehensive term and includes a definite regime of which hydrotherapy is only a part. The following are the chief indications for its use —

- (1) Many forms of arthritis and fibrositis
- (2) Circulatory disturbances of advancing years
- (3) Digestive troubles, including cholecystitis and gastritis
- (4) Metabolic conditions, such as chronic gout

In the past, patients suffering from any of these complaints have been content with considerable relief from their symptoms by a three weeks' course at a spa. To-day more is expected and more is obtained. A patient with *rheumatoid arthritis* on reaching a spa receives, after a thorough examination and review of his case, a definite programme of physical treatment, the details of which depend on the degree of his disease as estimated clinically and supplemented by laboratory findings, e.g., sedimentation rate of red cells, leucocyte count. At first treatment is mild and cautiously applied and will include many periods of rest. Hyper-thermal baths, local applications of dry and moist heat are given in conjunction with ordinary pharmacopœial help. Splinting to avoid contractures, remedial exercises, are all employed, and the outlook in this crippling condition is hopeful if physical treatment precedes permanent damage.

Osteoarthritis and *fibrositis*, probably the most common complaints at a spa, after thorough etiological investigation receive more vigorous treatment. For the nervous and circulatory disturbances subthermal effervescent baths are given with sedative and stabilizing effect. Many and different types of baths and douches are used, but it is generally agreed that the temperature of the water and the duration of the bath are of far more importance than the particular method by which it is applied.

For *digestive troubles* a correct diet, together with a definite time-table for drinking the mineral water, is given to each patient. The prescribed amount taken in the early morning and at other times of the day when the stomach is empty are of service in many gastric and hepatic disorders. The obese subject whose gall-bladder is under suspicion is a type for which this form of spa treatment is eminently suited.

Patients suffering from *chronic gout* benefit from the diuretic effect of the waters as well as from hot-air treatments and immersion baths.

Turkish bath installation is not considered a necessary adjunct to a spa's equipment, but is extremely valuable for many states in which profuse diaphoresis is required. The spa which possesses a good up-to-date bath of this kind is fortunately placed.

THE USE OF SPA WATERS

On the traditional usage of their respective waters most spas continue to rely. This distinguishes them from physiotherapeutic establishments in which hydro-

therapy is not so prominent a feature, and therefore makes for a certain degree of specialization in accordance with the recognized medicinal properties of the different springs and the maladies for which they are applicable

In the majority of spas the water is used internally as well as externally, and it has been authoritatively claimed that if spas existed simply to make people drink sufficient plain water they would have justified their existence. Certain it is that as a rule this natural eliminative procedure has been the foundation of a spa's success and continues to be a most necessary, although often neglected, part of present-day treatment. Regular intake of water daily and in sufficient quantity is an essential part of the spa regime.

Two plans which are purely diagrammatic and imaginary illustrate the main desiderata of —

- (1) A spa town with its services and amenities
- (2) A spa centre for physiotherapy and baths

Fig. 1

In (1) natural features are made to conform with the requirements of the spa buildings and their layout. In reality the position would be reversed and natural features would largely govern the plan. It is designed to demonstrate —

- (1) Chief medical buildings and their relation to each other
- (2) Relation of these buildings to the main part of the town
- (3) Communications and traffic circulation presented formally
- (4) Zones and their functions

The natural conditions have been assumed to be those typical of this country with south west prevailing wind and the sunniest aspect to the south. For the sake of graphic simplicity contours are omitted but it is intended that the ground should rise gradually from south to north leaving the spa buildings and gardens with shelter from the north and east. The hospital is on a spur of the surrounding hills isolated from the other buildings by its orientation rather than by its distance from them. A town with a population of 50,000 to include permanent and temporary residents is contemplated.

The main highway forms a western border, the railway and factory area are placed on the east, between these boundaries are the spa buildings and gardens, hotels, hostels, shopping facilities, flats, schools and offices, whilst on the outskirts would be an extending residential area.

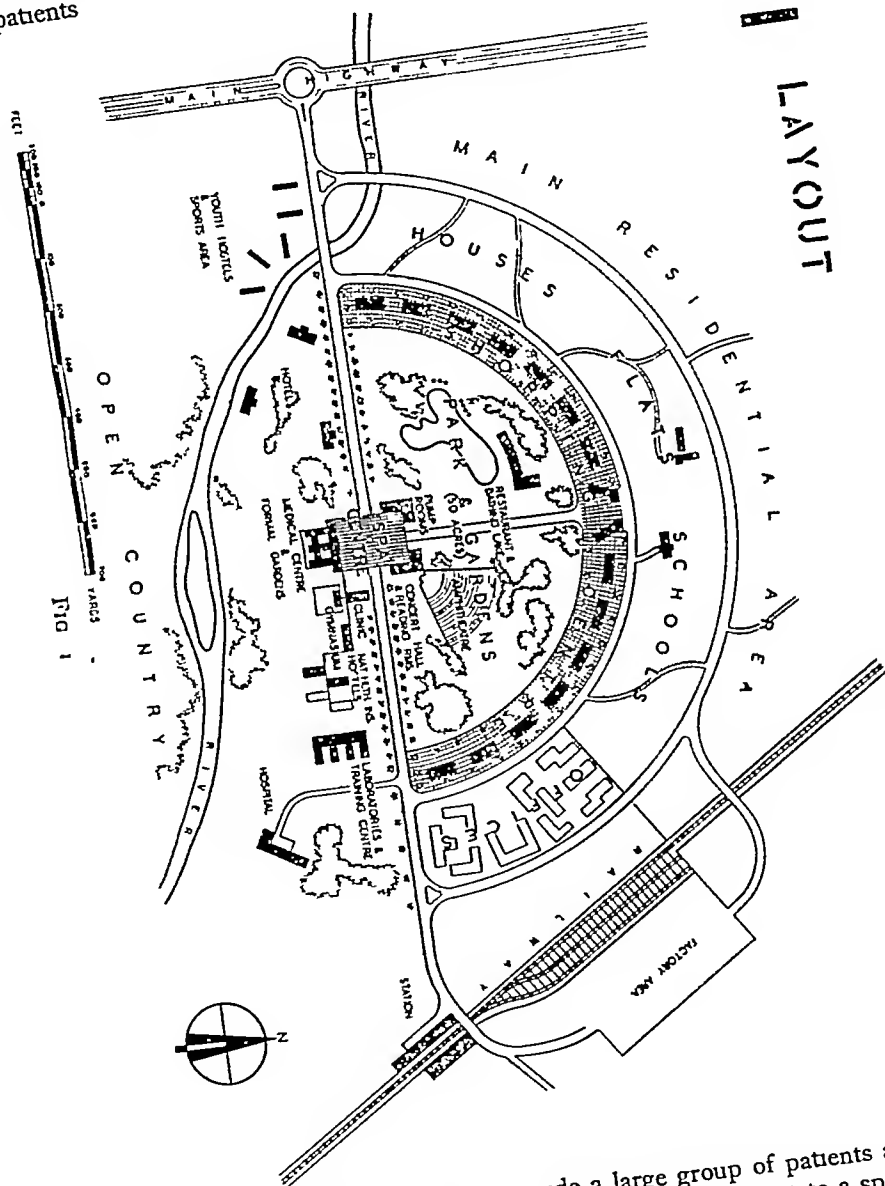
It is, however, to the baths and applications that the spa patient turns with confidence for the relief of his symptoms, and his faith is on the whole justified by the benefits he derives, provided that his treatment has followed accurate anatomical and physiological diagnosis. The special indications for balneotherapy will continue to be the chief concern of the men practising in spas, and they have learnt from experience the uses and limitation of their local springs. This will have been gained by the study of the varying disorders which overtake the middle-aged.

Men and women suffering from *mental overstrain* and bodily inactivity constitute the great proportion of those who visit a spa, and presumably this will continue when international peace returns. Many have discovered that spa treatment in their own country is just as recuperative as that obtained after long and harassing journeys to the Continent, and it is expected that the Government will in the fullness of time recognize the part played by spas in the cause of public health, and will assist by subvention the local authority which renders this service.

In these stirring times, convalescence, holidays and recreation cannot be enjoyed with the same leisurely freedom of the past, and to-day, when life is strenuous

THE FUTURE OF SPA TREATMENT

and time seems so precious, the spa medical officer is often called upon to restrain patients in their eagerness for immediate and almost continuous physical therapy. A vigorous daily treatment, whilst right and proper in many instances, can be exhausting and harmful in others. Intervals of rest are of the greatest importance to spa patients.



Chronic rheumatism and its allies provide a large group of patients at all spas, and these in many cases have learnt to rely on an annual visit to a spa that they

But perhaps the most important requirement of any spa is a hospital where careful and thorough investigation can be carried out by physicians and surgeons who have made special study of conditions for which physical medicine is applicable. All laboratory and radiological services essential to clinical pathology must be available and a close liaison between the hospital and spa established. This is already appreciated and exists in all the federated spas. Therefrom has emanated a considerable amount of profitable research much more lies ahead and will be rendered possible if the plans recommended by Lord Horder and the Empire Rheumatism Council are adopted nationally. It is here that the benevolence and cooperation of the universities and medical schools have been sought with some success, and it is confidently expected that with the new social approach to medicine the student may find that his curriculum will be directed as much towards the maintenance of health as to the cure of disease, and that physical foundations will claim his attention more than heretofore.

GENERAL MANAGEMENT OF THE SPA

The success of a spa depends in no small degree on the energy and ability of its manager who must, after careful selection, be given a free hand in all schemes for the development and improvement of his charge. He is himself responsible to a committee, the composition of which is of the first importance so that various points of view may find expression especially is it necessary for medical opinion to be adequately represented on that body in order that the primary *raison d'être* of the spa should never be lost sight of. Amenities and entertainment, though desirable and indeed essential, are apt to overshadow medical necessities unless the latter are duly safeguarded, and to the manager will fall the task of adjusting the balance between rest and recreation on the one hand and gaiety and diversion on the other. Above all he will see that noise of all kind is kept under control. A well-arranged and constructive social programme will go far to increase the usefulness of the spa and the recovery of its patrons.

SPA TREATMENT AND ITS RELATION TO REHABILITATION

From what has been said it is clear that the British health resorts are anxious to use all their endeavours and resources for the furtherance of positive and national health. What service can a spa render in restoring to physiological health a man or woman temporarily incapacitated by injury or illness? Balme (1943) has recently reviewed the present organized system of rehabilitation and points out the many problems which await the worker in this subject. He utters a salutary warning lest rehabilitation should become a new health cult divorced from medical or surgical control. Especially does he emphasize the need for experimental research into many common disabilities for which physical treatment is prescribed. Only by observation of a long series of cases can reliable data concerning the indications for and the value of specific physical exercises be obtained. Results of far-reaching importance to the individual as well as to the nation will follow the labours of an enthusiastic team of workers in this direction, and here will be a distinct opportunity for the well-equipped spa hospital, with its wealth of clinical material, to give its assistance. Physical instruction, as exhibited in many of the hospitals of the Emergency Medical Service, is already providing much useful information and

is should prove to be of considerable assistance to post-war centres in the anagement of all crippling diseases, as well as in their efforts to prevent them. The possession of a hospital will enable the spa to undertake the care of a patient who is still in the acute or at any rate subacute stage of his illness, although, to avoid congestion, these initial resting or febrile periods will be best and most conveniently undertaken in or near the patient's own home. Subsequently the hospital would carry on the clinical treatment with its own special advantages by so doing. Progress will be estimated by the correlation of clinical and laboratory findings. The sedimentation rate of the red blood cells determined at regular intervals, the presence or degree of anæmia, and many other investigations will be at hand to guide the practitioner. Especially will it be remembered that in rheumatoid conditions over-strenuous treatment is dangerous if employed too early. The facilities of a hospital will be available for the discovery of any etiological or aggravating factor in every case, and focal infection can receive prompt and thorough attention when necessary.

The hospital will have attached to it a training school of physiotherapy where the students will learn the technical side of physical medicine as applied prophylactically and curatively.

Much can be done by these and other means to improve the physique of those predisposed to rheumatoid and other conditions, and in-patient treatment at a spa hospital, followed by out-patient attendance, would seem to be a sound stepping-stone on the path towards recovery from many ailments. To what grade of recovery a patient in a spa hospital should attain is a matter of future arrangement, but it should be the aim of each to produce a full programme for every patient, from simple muscular drill to heavy occupational therapy, which will enable him to resume his life as a wage-earning citizen.

SUMMARY

From these general observations it will be seen that —

- (1) A distinct change of outlook is overtaking the spas of Britain. Here plans are afoot for the maintenance and improvement of the nation's health.
- (2) There will still remain as visitors to the spas those for whom palliative and retardatory treatment is alone applicable.
- (3) Attention to early signs and symptoms will stem the flood of those misfortunes which now ravage the country, and are considered chronic or incurable.
- (4) Rest at home, or in hospital, where etiological factors can be investigated, will be enjoined as a first step to treatment.
- (5) Spas, with their natural advantages and the experience gained therein, should be able by enthusiasm and enterprise to render useful service as rehabilitation and health centres.
- (6) Two plans, drawn for me by F. B. Charles, are intended to indicate graphically the chief essentials of a modern spa.

References

- Foster, M (1933) "Baths and Medicinal Waters of Great Britain and Europe," London.
 Horder, Lord (1942) "Rheumatism. A Plan for National Action," Empire Rheumatism Council, London.
 Balme, H (1943) *Brit med J*, 2, 47.

It would be a great pity if the degree of toxicity attributed to these compounds were related in any way to commercial interests, but one effect of the careful reading of published reports has been the development of a sense of astonishment at the ease with which *A* can show that compound *x* is more toxic than compound *y*, whilst, a month or so later, *B* "proves" that when used in treating the same condition, *y* is much more toxic than *x*. Perhaps the present competition between manufacturers to obtain the most effective "general purpose" sulphonamide will prove in the long run to be productive of the most satisfactory results, but unfortunately it involves a good deal of duplicated effort which, to-day, it should be possible to avoid by the pooling of ideas and resources. At the present time, a situation has arisen whereby a manufacturer introduces a new compound as a "reply" to the success gained by another manufacturer who was in the field with a similar compound at an earlier date. It is worth while recalling here the injunctions of the Council on Pharmacy and Chemistry of the American Medical Association in their summary (*New and Non-official Remedies*, 1943) of the grounds on which the choice of a sulphonamide compound should depend. "It should not be based on caprice or chance, but on bacteriological diagnosis, experience dictated by knowledge of the experimental therapeutic background of these drugs, their pharmacological properties in man, their clinical efficacy and, finally, the variety, frequency and severity of the toxic reactions which may be produced by the drug."

SULPHANILAMIDE

LOCAL APPLICATION—The popularity of sulphanilamide in the oral treatment of infections has declined somewhat because of the availability of other compounds which appear to have a selective action and which are becoming in relatively good supply. On the other hand, the topical use of this compound in the treatment of *superficial infections* and in the prophylaxis of *contaminated wounds* has developed, and it shares with sulphathiazole the distinction of the most widely employed sulphonamide for these purposes. The U.S. Army and Navy have adopted a standard 5-gramme package of sulphanilamide for use by the medical services. It consists of an envelope, provided with a series of perforations at one end through which the small crystals are shaken, giving even distribution over the wound area. The outer container is made of cellophane, which protects the sulphanilamide against moisture and contamination by mustard gas. Since the last survey of sulphonamides (*The Practitioner*, 1942, 148, 93) appeared, the question there asked whether a mixture of sulphanilamide and sulphathiazole would not form a better local application than either compound alone has been answered in the affirmative by the recently issued M.R.C. Memorandum ("The Medical Use of Sulphonamides", 1943) in which a mixture of 3 parts of sulphanilamide and one part of sulphathiazole is recommended.

The case for the use of crystalline instead of powdered sulphanilamide has been argued by Long (1943b) who considers that crystals which pass through a 40 to 80 sieve are best; larger crystals start local reactions, whilst finely powdered sulphanilamide tends to cake in the wounds. Long's observations have shown that sulphathiazole and sulphadiazine are absorbed less readily than sulphanilamide from open wounds, and that the first two compounds, as well as sulphapyridine,

is more likely to set up foreign body reaction in wounds than is sulphanilamide, due, probably, to the greater solubility of those substances. From these and other factors he concludes that although the local implantation of sulphanilamide may interfere to some extent with wound healing, it is the least harmful of the commonly used sulphonamides to granulating tissues. Of the quantity which should be applied to a wound Long recommends 0.05 gm. ($\frac{3}{4}$ grain) per square inch for wounds which are closed by primary suturing, whereas for contaminated wounds 0.1 gm. ($\frac{1}{2}$ grains) per square inch is necessary, the maximum amount to be used locally is no more than 10 gm (160 grains) in twenty-four hours. British and Russian surgical opinions favour an impalpably fine powder, one that used to require admixture with zinc oxide or other absorbent to prevent caking, but which, by improved methods, such as heating in the presence of calcium chloride, can now be made without the presence of any additional substance. Whatever the form of the sulphonamide, it must be sterilized by heating at 150° C for one hour or at 140° C for four hours. To prevent caking in the wound, dressings moistened with a 1 in 3300 solution of azochloramid are sometimes applied after the sulphanilamide has been dusted on to the wound and the whole sealed with boric acid ointment or paraffin gauze. One development of the increasing interest taken in the aminoacridines for the local prophylactic treatment of wounds has been the trial of a mixture of proflavine 0.25 gm (4 grains) with sulphanilamide 2 to 5 gm (30 to 75 grains).

Satisfactory results continue to be reported from the *treatment of burns* with sulphanilamide, especially when this is incorporated in an ointment. A new cream, used successfully in the Burns Unit, Royal Infirmary, Glasgow, is made by heating castor oil 25 gm to 70° C, adding lanette wax SX 10 gm and, when this has melted, incorporating 45 c cm. of water at 65° C. The mixture is kept at this temperature for two hours to kill off non-sporing organisms. Meanwhile sulphanilamide 10 gm is rubbed down with glycerin 10 gm, heated to 60° C and added slowly to the cream. For application to the burn the cream is spread on gauze or linen, or it may be spread over the affected area with a sterile spatula. The latest information on the value of cod-liver oil in ointments of this nature does not substantiate earlier reports which attributed to it some special virtue. Surgical gauze impregnated with 30 per cent. of sulphanilamide is now available, one square foot contains approximately 8.5 grains (0.5 gm) and a piece 4 ins square contains about 1 grain (0.06 gm). It is claimed by the makers that repeated sterilization does not reduce the sulphanilamide content nor is the tensile strength of the gauze affected. Gauze so medicated has been found by H. E. Anderson and others (1942) to be an improvement on iodoform gauze when used for uterine packs. For local use in dentistry, to control the bacterial flora of a socket and to promote granulation, Moss (1942) uses an ointment containing powdered sulphanilamide 25, benzocaine 2, and eugenol 1, in a lanolin and soft paraffin base.

For *ophthalmic use* an ointment containing sulphanilamide 0.3 gm, liquid paraffin 15 c cm with wool fat to 65 gm, has been advocated.

A compound of sulphanilamide and mandelic acid, sulphanyl mandelate, has been prepared for use in treating *uncomplicated bacillurias*, doses of 4 to 5 gm daily in four divided doses being given. The product is available in 0.5 gm tablets.

Sodium sulphapyridine is made by crystallization from dilute alcohol equimolecular proportions of sulphapyridine and sodium hydroxide. It is freely soluble in water, producing an alkaline solution with pH 10.85 (Spink, 1942). On this account the only available route for parenteral administration is by intravenous injection, generally as a 5 per cent solution, the average dose being 0.06 gm per kgm body weight. As sodium sulphapyridine is used only by injection, the U.S.P. insists that it shall comply with tests for sterility and that it shall be issued only in sealed containers holding not more than 10 gm, with the batch number on each package. There is also some evidence that a 40 per cent solution of sodium sulphapyridine has a hæmostatic action, for which purpose it has been suggested for the control of the secondary hæmorrhage that often occurs after tonsillectomy.

SULPHACETAMIDE

The sodium compound of sulphacetamide forms an almost neutral solution in water and hence is used extensively in the treatment of infections of mucous surfaces, e.g. the conjunctiva, where the strongly alkaline solutions produced by the sodium compounds of the other sulphonamides would probably damage the delicate tissues. Thus in certain Scottish collieries a 10 per cent solution of sodium sulphacetamide has replaced "factory eye-drops" (mercuric chloride and cocaine in castor oil) and the Department of Mines has been urged to adopt this method of treating corneal injuries throughout the country.

For burns involving the eyelids, as well as the conjunctiva, Johnstone (1943) has suggested the use of a cream containing sulphacetamide solution 30 per cent, 10, water 25, glycerin 30, "unemul" 5, cod-liver oil to 100. The desirability of using an insoluble substance such as colloidal aluminium hydroxide ("unemul") may be open to question, but the fact that it is inert is a point in its favour. Unless this substance is added, the cream is apt to develop a granular and unsatisfactory appearance, but with the addition of unemul, a stable and homogenous preparation is obtained. A simpler formula, incorporating a larger proportion of the sulphonamide, contains one part of sodium sulphacetamide dissolved in the minimum of water and made up with hydrous lanolin ointment sufficient to produce 10 parts.

SULPHADIAZINE

This compound has been accepted by the Council on Pharmacy and Chemistry of the American Medical Association, which reports (1942) that patients suffering from acute toxic reactions, caused by other sulphonamides, may be switched over to sulphadiazine without the existing reactions being prolonged or accentuated by this compound. Nevertheless, the warning is given that patients receiving sulphadiazine should be seen daily, in order that any possible toxic effects that arise may be noted and the drug eliminated by the administration of fluids as rapidly as possible, a view which is emphasized by Talbot and Adcock (1943) who suggest that sulphadiazine is by no means as innocuous as it was once believed to be. The recommended dosage for adults is 0.1 gm per kgm body weight, followed by 1 gm every four hours until the temperature has been normal for seventy-two hours. For children the initial oral dose is based on 0.1 to 0.15 gm per kgm body weight, subsequent doses consisting of one-quarter of the initial dose, given at intervals of six hours. A useful summary of the advantages of sulphadiazine is provided

the result of an investigation by Wheeler and Plummer (1942) on 218 patients who received sulphadiazine and sodium sulphadiazine, both orally and intravenously over long periods. It was found that (1) sulphadiazine given by mouth produces higher concentrations in the blood and smaller proportions of the acetylated compound in the blood and urine than do other more commonly used sulphonamides, (2) sodium sulphadiazine given by mouth produces higher concentrations in the blood than does sulphadiazine, (3) initial doses of 4 gm. of either compound are more effective than doses of 2 gm., (4) by intravenous injection sodium sulphadiazine yields a high level of the compound in the blood, is acetylated to only a slight extent and appears to be relatively non-toxic, (5) toxic reactions are less frequent and less serious than after the use of other sulphonamide compounds.

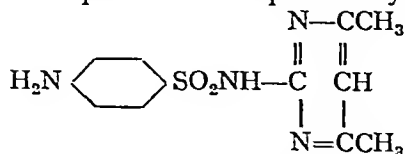
The recommendation of Pickrell (1941) that sulphadiazine should be used *locally in the treatment of burns* has received endorsement from Fox (1943) of the United States Navy, who uses in first-aid treatment an ointment of sulphadiazine 5 per cent. and triethanolamine 8 per cent. in a stearin basis, and for hospital treatment a spray of sulphadiazine 3 per cent. and triethanolamine 8 per cent. The pH of this spray is 8.7 but, owing to the action of light, it must be stored in dark glass bottles. Because of its high alkalinity the sodium compound is not suited to local use and the base itself is employed.

For *cranial wounds*, when the cerebral cortex is exposed, results from sulphadiazine have been favourable, this sulphonamide apparently causing no destruction of tissue and only a negligible foreign-body reaction on the meninges (Hurteau, 1942).

Flexible films containing 30 to 50 per cent. of sulphanilamide or sulphadiazine with a base of methyl cellulose and a little triethanolamine and sorbitol have been tried out in America in the *treatment of burns*. An alcoholic or acetone solution of the constituents is sprayed on to glass and when dry removed as a single sheet. At Johns Hopkins Hospital these sheets are cut into three-inch widths, rolled as a bandage and sterilized by dry heat. The film is applied to the cleaned surface of the burn and, with burns of the first or second degree, left in position for three to five days.

SULPHAMETHAZINE

This compound differs from sulphadiazine to a relatively small extent, both contain the pyrimidine ring, sulphamethazine having a methyl group in the 4 and 6 positions. It is often spoken of as sulphadimethylpyrimidine and has the formula.—



The introduction of the two methyl groups has the effect of producing a compound which itself is not only more soluble in water but the conjugated (acetylated) form is also more soluble than is acetyl-sulphapyridine, acetyl-sulphathiazole, or acetyl-sulphadiazine, and therefore is less likely to provoke renal injury.

The pure compound as supplied by the makers consists of pale yellow crystals.

SUBCUTANEOUS INJECTION

Although subcutaneous injection of the sodium sulphonamides is usually avoided, a case has been made out for their safe administration by this route. Taplin, Custer and Young (1943) prepared a solution by dissolving 4 to 8 gm of the sodium compound of sulphapyridine, sulphathiazole or sulphadiazine in one litre of isotonic solution of three chlorides, in 0.9 per cent sodium chloride, and in one-sixth molar sodium lactate, heating the solution to boiling and allowing it to cool to body temperature before administration. The pH values of 5 per cent solutions of the sulphonamides in isotonic saline were: sodium sulphapyridine 10.0, sodium sulphathiazole 9.5, sodium sulphadiazine 9.2. In general it was found necessary to give 5 to 7 gm of sulphapyridine, 7.5 to 8 gm of sulphathiazole, and 5 gm of sulphadiazine in 1000 ccm in order to obtain adequate blood levels of the compound. No local reactions were observed and sodium sulphadiazine proved to be the most convenient compound to use hypodermically. To avoid the dissociation which always occurs in aqueous solutions it has been suggested that propylene glycol be used as a solvent for, unlike ethylene glycol, the propylene compound has been shown to be non-irritating. Yonkman, Lehman and Chase (1942) examined the effects of injecting solutions containing 10, 20, 25, and 50 per cent concentrations into rats, rabbits, dogs and man, using as a diluent 0.9 per cent sodium chloride. They found that except for a transient irritation when the intramuscular route was chosen there were no immediate or delayed effects. The sulphonamides are soluble in propylene glycol in the following approximate proportions—sulphanilamide 10 per cent, sulphathiazole 3 per cent, sulphapyridine 3 per cent, sulphadiazine 0.3 per cent.

References

- Anderson, H. E., *et al* (1942) *Amer J Obst Gynec*, **42**, 410
 Chambers, L. A., *et al* (1942) *J Amer med Ass*, **119**, 324
 Crusellas, J. (1942) *J Amer pharm Ass*, **31**, 157
 Dewing, T., *et al* (1942) *J chem Soc*, pt I, 239
 Fox, T. A. (1943) *J Lab clin Med*, **28**, 474
 Garson, P. (1943) *Brit med J*, **2**, 452
 Harris, T. N. (1943) *J Amer med Ass*, **121**, 403
 Hurteau, E. F. (1942) *Can med Ass J*, **46**, 15
 Johnstone, I. L. (1943) *Brit med J*, **1**, 605
 Leberman, P. R., and Alexander, R. (1943) *Amer J Syph*, **27**, 187
 Long, P. H. (1943a) *J Amer med Ass*, **121**, 312
 — (1943b) *Ibid*, **121**, 303
 Macartney, D. W., *et al* (1942) *Lancet*, **1**, 639
 Macgregor, I. M. (1943) *Brit med J*, **1**, 414
 Moss, R. W. (1942) *Aust J Dent*, **57**
 Peterkin, G. A. G., and Jones, E. C. (1943) *Brit med J*, **1**, 319
 Pickrell, K. L. (1941) *Bull Johns Hopkins Hosp*, **69**, 217
 Pulvertaft, R. J. W., and Mackenzie, D. H. (1943) *Lancet*, **2**, 379
 Report by the Council on Pharmacy and Chemistry (1943) *J Amer med Ass*, **121**, 1008.
 Rose, H. M., and Fox, C. L., Jun. (1942) *Science*, **95**, 412
 Schmidt, L., and Sesler, C. L. (1943) *J Pharmacol exp Ther*, **77**, 277
 Spink, W. W. (1942) "Sulphanilamide and Related Compounds in General Practice," Chicago
 Talbot, T. R., Jun., and Adcock, J. D. (1943) *Amer J med Sci*, **205**, 841
 Taplin, G. V., Custer, E. A., and Young, L. E. (1943) *J Amer med Ass*, **121**, 311
 Wheeler, C., and Plummer, N. (1942) *Ass intern Med*, **16**, 269
 Wruble, M. (1943) *J Amer pharm Ass*, **32**, 80
 Yonkman, F. F., Lehman, A. J., and Chase, H. F. (1942) *J Amer pharm Ass Abt.*, **3**, 328, 339

SOME MEDICAL ASPECTS OF AXIS PRISON CAMPS

By CAPT J C MUSTARDÉ, R.A.M.C., B.Sc., M.B., Ch.B.

PREAMBLE

MANY excellent and instructive articles have been written during the course of this present war dealing with the different medical aspects of British-controlled prisoner of war camps, for obvious reasons, less mention has been made of the medical work in Axis-controlled camps, at least, in Allied journals, and it is the purpose of this article to attempt a short survey of a year's experiences in Italian prison camps and hospitals, looked at from a purely medical point of view. First, however, it may enable the reader to reach a clearer appreciation of the circumstances under which we prisoner of war medical officers had to work if a short summary of my own period of captivity is given, and I beg to be excused if, for a few brief sentences, I make undue use of the personal pronoun.

I was captured by Germans after the fall of Tobruk on June 20, 1942, and spent the first few hectic days immediately following this catastrophe working in the theatre of the British Military Hospital under German direction. At the end of this time most of the medical officers were sent by lorry via Derna to Barce and thence to Benghazi, where I arrived on June 29. At Derna, and again at Benghazi, sanitary arrangements were so primitive as to be almost non-existent, and an outbreak of Shiga type dysentery rapidly developed in the crowded pens, aided by the millions of flies attracted to the uncovered mounds of faeces.

From June 29 to July 4, I shared the medical responsibility of the large open "cage" at Benghazi with ten other medical officers. There were some sixteen thousand men herded together in this camp, and the number of fresh cases of acute dysentery which were reported daily reached epidemic proportions. Eighty to a hundred of the worst cases were admitted to hospital every twenty-four hours, and many hundreds of others less seriously ill were kept under surveillance in the camp. A colleague, Captain Gilbert (quoted by Boyd, 1943), who remained in this camp until October, has given a description of the conditions obtaining there, and I can add nothing to his account beyond stressing the point that I believe the widespread prevalence of dysentery in the camps throughout Tripolitania was due in large measure to the appalling sanitary conditions existing at Derna and Benghazi before the advent of the British medical officers at the end of June.

On July 4, in company with fourteen medical officers and two chaplains I travelled to a camp at Tarhuna, some eighty kilometres south-east of Tripoli, where just over two thousand prisoners were being held, prior to transshipment to Italy. After almost a month's delay we were distributed amongst different camps nearby and put in semi-medical charge under Italian medical officers. I myself remained at Tarhuna until October 13, when I fell ill and was removed to Tripoli hospital, but my colleagues stayed at the camp until the end of November, when all the prisoners were shipped over to Italy in cargo vessels (battered down, and in stinking, crowded quarters, many of these men lost their lives when the ships they were in were torpedoed and sunk.) I was more fortunate, being taken to Naples by hospital ship, and from November 23 until May 5, 1943, I passed through several hospitals and camps in different parts of Italy, being finally repatriated to Egypt, via Turkey, on May 10.

INTRODUCTION

These observations are mainly concerned with experiences in the camps of North Africa during the first five months after the fall of Tobruk. I have tried to be specific and accurate, and to give figures wherever possible, but it must be understood that all notes which were made at the time had to be carefully concealed to

however, this is no criterion that there were not perhaps a few undetected cases. In view of our experience at Tarhuna, I feel certain that Colonel Boyd is right in postulating that the universal immunity shown by British prisoners to enter fever, while under insanitary conditions and amidst a people who were themselves widely infected, must be attributed to the efficacious annual inoculation with potent T A B vaccine carried out routinely in the British Army.

DIET

Apart from the presence of disease itself and the lack of adequate means of dealing with it, the chief trouble in these camps was the insufficiency of the diet, both qualitatively and quantitatively. The camps were officially designated "Trans Camps," and as such were on an extremely meagre ration scale, which range from a 400 gm loaf plus a 3½ ounce tin of almost inedible meat substance—mostly aorta and tendon—to a cupful of rice, a 350 gm loaf, 2 tablespoonsfuls of lentils and a small piece of meat or cheese no bigger than a cubic inch. In addition to these daily items, there was supposed to be a ration of 1 tablespoonful of olive oil, 1 teaspoonful of sugar, 10 gm of cheese, ½ tablespoonful of preserved tomato purée and a cup of watery ersatz coffee made from ground acorns, but these were issued most irregularly, at the discretion of individual Commandants, and in many of the camps were never seen at all. Not only was the scale of food as actually laid down quite inadequate for periods of more than two, or at most three, weeks, but we discovered, in Tarhuna Camp at least, that only about 60 per cent of the stipulated quantity of each item issued was actually reaching the men. On one well-remembered occasion, by the aid of a syringe and the formula $10 \text{ c cm H}_2\text{O} = 10 \text{ gm}$, I succeeded in producing a reasonably accurate series of weights, a beam balance was rigged up in the cookhouse and when the stores were checked that morning it was ascertained that a certain commodity was 45 per cent underweight! The Commandant was apprised of the situation and, to our amazement, refused to witness the weighing process, the beam balance was torn down and destroyed and reprisal measures were quickly enforced against the medical officers and against the men themselves.

I have drawn up a table in which is shown the daily rations per prisoner and they should have been received, against this I have shown the estimated calorific value of each item and also the calorific value of the actual quantities received. It will be seen that even on the most generous estimate the total number of calories supplied by the diet was little more than one-third of the normal requirements of an average-sized man, living a sedentary life, and with no manual work to perform—

Item	Calories (approx.)	Amount actually received	Calories (approx.)
10 gm cheese	44	None	—
15 gm olive oil	135	Less than 25 per cent.	30
10 gm sugar	40	None	—
60 gm rice	216	About 66 per cent	140
20 gm lentils	65	Less than 50 per cent	30
100 gm meat plus bone	300	Less than 25 per cent	70
350 gm bread	800	100 per cent	800
	<hr/> 1,600 <hr/>		<hr/> 1,070 <hr/>

If the complete scale had actually been received by the men they would have been living on a basic calorific-value diet, but receiving only 1,100 or so calories as they did per day it was impossible to maintain a physiological balance of energy over a period of months, and on account of this we had to prohibit all exercises and games involving even moderate physical exertion. Despite this precaution, on several occasions men reported sick, complaining of tremors, sweating and slight mental confusion, and these cases we attributed to mild hypoglycæmia. One of the cases was a medical officer who, having constructed a lathe from odds and ends picked up (or surreptitiously removed) from about the camp, expended, rather unwisely, a great deal of irreplaceable energy working the treadle of the apparatus. Although it must be admitted that he turned out quite passable hessmen, on two separate occasions he approached a state bordering on hypoglycæmic coma.

Proteins and fats, especially animal fats, were present in extremely poor proportions, but as such a state of affairs exists even in the normal peace-time diet of the Italian race, it was only to be expected that carbohydrates would form the great bulk of the food. It is interesting to note at this point that most of us, on receiving our first Red Cross parcels in Italy at the end of November, showed a marked preference for the butter, bacon fat and chocolate, at least for the first few days of such unaccustomed "abundance."

VITAMINS—One important point which must be immediately obvious is that this bread and rice diet was extremely deficient in vitamin content, both fat soluble A and D, and water-soluble B complex and C, it was our conviction that although no ill-effects could be directly attributed to vitamin deficiency for some few months, no doubt lack of these substances was one of the contributing factors to the physical weakness and general inertia which affected us within three to four weeks of starting this "transit" diet. With the passage of time, however, certain definite pathological conditions, such as beri-beri (of both wet and dry type), began to develop, and I think the simplest plan will be for me to consider first the general effect of the vitamin deficiency and then the particular results of the individual avitaminosis as they affected the prisoners under our care.

Vitamin deficiency in general.—Mention has already been made of the physical weakness and inertia which affected the men during the first month of captivity. It might be argued that such symptoms were due entirely to lack of adequate carbohydrate and protein, or to psychological factors, or to a combination of both, but these milder complaints soon developed into marked lassitude, depression, irritability, insomnia, and in some cases anorexia, although affecting some of the prisoners more than others, and I do not consider such explanations are sufficient in themselves. These later conditions, combined with a much greater susceptibility to infection, must I think be attributed, at least in part, to general vitamin deficiency.

Vitamin A—Although, by reason of its natural distribution, the amount of this vitamin in the diet must have been almost negligible, none of the usual affections of the epithelial tissues attributable to vitamin A lack, such as follicular hyperkeratosis, were noted. Night-blindness, which is described as an early manifestation of such deficiency, was not complained of at any time, but as no

These ulcers, or "desert sores" as they were then termed, were a source of great trouble and inconvenience to the medical officers of all units operating in the dry sandy Libyan desert, and it had long been recognized that vitamin C deficiency, combined with the dryness of the climate, was in large part responsible for the condition, it had also been demonstrated that large numbers of such sores were infected with Klebs-Löffler diphtheria bacilli. We explained this last feature to the Italians and were politely told that they knew all about it. Nothing was done to help, however, beyond issuing quantities of ichthyol paste. These sores affected almost everyone and took weeks, in some cases months, to heal, crusts formed almost daily and necessitated much time and labour to effect their removal before applying the paste. Many of the sores healed only after the men had been transferred to Italy.

Malarial cases—A few old infections, so far as we were able to ascertain, caused quite a lot of trouble on sick parades as we rarely had any quinine, or even aspirin (!) to give the sufferers. The poor fellows usually had to lie down and "stew" for a few days until the fever left them.

CONCLUSION

These then were the main conditions with which we had to deal, not in themselves overwhelming, but in view of the limited supplies of drugs allowed us—*aspirins*, cathartic pills, cough tablets, bismuth and opium and magnesium sulphate, all in very inadequate and irregular quantities—extremely difficult to deal with properly and satisfactorily.

During the later months we fully expected some devastating epidemic to break out amongst so ill-protected and poorly-fed a collection of individuals, and it was a minor miracle to us that no such holocaust took place. There were some eight or nine cases of diphtheria at the end of July, two possible cases of cerebrospinal meningitis, three cases of anterior poliomyelitis, and one case of a cerebral attack of relapsing fever in an officer previously infected in Upper Egypt. All these patients were transferred to hospital after much raising of objection on the part of the Italians, and usually with three or four days' delay before an ambulance could be sent. One most astonishing feature of these crowded camps, where every man was liberally covered with lice of all sorts and sizes, was the absence of any recorded outbreak of typhus, a contingency which we daily expected to meet, and to the tackling of which we gave much anxious consideration.

Lastly, I must mention two cases of appendicitis which developed in the camp. On both occasions no ambulance was forthcoming for three days to remove the men to hospital and they arrived in Tripoli with distended bellies, perforation, followed by the setting-in of acute peritonitis, having taken place either just before or during the fifty-mile journey to hospital. Both men were given large doses of morphine on admission, and died shortly afterwards.

Reference

Boyd, J. S. K. (1943) *Brit med J*, 1, 719

THE INTERPRETATION OF PHYSICAL SIGNS*

I—PHYSICAL METHODS OF EXAMINATION IN CARDIOLOGY

BY CRIGHTON BRAMWELL, M.D., F.R.C.P.

Professor of Systematic Medicine, University of Manchester, Physician, Manchester Royal Infirmary

IN cardiology there are four aspects of diagnosis—(1) Structural lesions, (2) disorders of function, (3) the disability, (4) the etiology

It is with the first two of these that the physical methods of examination are chiefly concerned. the degree of the disability is assessed by the patient's capacity to undertake physical exertion, and the etiology of the condition is deduced from the nature of the structural lesions and disorders of function considered in conjunction with the clinical history and the results of certain special tests, such as the Wassermann reaction

STRUCTURAL LESIONS

In the diagnosis of structural lesions and disorders of cardiac function, a number of physical methods are at the disposal of the clinician and his aim should be to employ those which are capable of yielding the most accurate and trustworthy information. The specialist is able to use radiography, electrocardiography and other instrumental methods, but the general practitioner has to rely chiefly on his unaided senses, and from inspection, palpation, percussion and auscultation he can obtain much useful information, provided he recognizes clearly the limitations of these methods

CARDIAC ENLARGEMENT—An enlarged heart is generally a diseased heart, hence evidence of cardiac enlargement is always important. Such evidence is best given by X-ray examination, but, when this method is not available, it is necessary to fall back on palpation and percussion.

The most reliable clinical guide to the left heart border is the *maximal cardiac impulse*. This impulse is produced by the systolic impact of the turgid apex of the left ventricle against the chest wall, but to be of any value in cardiometry it must be a definite thrust which is strictly localized. When the impulse is not palpable with the patient lying on his back, it can sometimes be felt when he turns on his left side. This change of posture usually involves an outward displacement of about 2 cm.

The position of the cardiac impulse in normal subjects varies with the body build of the patient. In adults of average build, it is situated in the fifth intercostal space, slightly internal to the mid-clavicular line, but in people with long narrow chests, the viscera tend to be disposed more vertically and, in them, the maximal impulse may be situated in the sixth space correspondingly closer to the midline. Conversely, in the wide shallow-chested type with a high diaphragm,

* At the special request of a subscriber a short series of articles by experts has been arranged to deal with methods of examination, the eliciting of physical signs and their interpretation, with reference particularly to the problems of general practice

Systolic murmurs at the base of the heart are rarely of pathological significance, and should not be taken to signify aortic stenosis, unless they are harsh in character and are associated either with the diastolic murmur of aortic incompetence or with a slow-rising pulse. A systolic murmur in the pulmonary area is often heard in patients with an overacting heart due to thyrotoxicosis or to other causes. It is believed to be due to a functional pulmonary stenosis produced by compression of the pulmonary artery by the heart against the chest wall. Systolic murmurs due to congenital lesions are usually harsh in character and accompanied by thrills.

Apical systolic murmurs—Some difference of opinion still exists, even amongst cardiologists of repute, regarding the significance of apical systolic murmurs. It is, however, generally agreed that it is wrong to restrict a patient's activities on account of a systolic apical murmur unless there is circumstantial evidence of heart disease, such as cardiac enlargement, impairment of the exercise tolerance, or a recent rheumatic history. I teach my students that an apical systolic murmur is equivalent to the notice "Halt! major road ahead." It is a reminder to look round carefully for other signs of heart disease before proceeding to decide that all is well.

There are many possible causes of so-called "functional" systolic murmurs. The mitral differs from the aortic valve in that defective closure depends most commonly not on the deformity of the valve cusps, but on lack of support from the muscular tissue surrounding the orifice.

Apical systolic murmurs are often heard in patients suffering from anæmia. When, as the result of treatment, the blood picture returns to normal, the systolic murmur usually disappears. The term "hæmic" was formerly applied to these murmurs, on the hypothesis that they were due to an alteration in the viscosity of the blood. It is, however, more probable that they are really a sign of temporary mitral incompetence, resulting from an atonic condition of the myocardium. The fact that such incompetence is curable, places these murmurs in quite a different category from those due to chronic valvular lesions.

Mitral regurgitation may also be the result of dilatation of the mitral ring secondary to dilatation of the cavity of the left ventricle.

A systolic murmur may be produced by the impact of the heart against the lungs, each heart beat giving rise to audible movements of the air in the bronchi. This "cardio-respiratory" murmur can often be recognized by the fact that it varies in intensity, and may even disappear entirely, during certain phases of respiration, but, in some cases, it is audible even while the patient holds his breath.

DISORDERS OF CARDIAC FUNCTION

BLOOD PRESSURE ESTIMATION—Estimation of the blood pressure, especially the diastolic pressure, sometimes presents difficulty. Sphygmomanometry is a rough method, and is only capable of yielding approximate figures. The pressure should therefore be stated as a multiple of 5 mm., to attempt to obtain a more accurate reading is neither scientifically sound nor clinically necessary, whilst in auricular fibrillation, since the pulse beats vary greatly in force, it is only possible to give a figure which represents a rough average of the different beats.

It is an advantage to take the first systolic reading by *palpation*, inflating the

armlet in steps of 10 mm and stopping as soon as the radial pulse disappears. Such a preliminary rough reading can be rapidly obtained—it serves as a check on the subsequent auscultatory reading and obviates the necessity of raising the pressure in the armlet to an unnecessarily high level before starting deflation. Compression of the arm is never pleasant for the patient on account of the congestion produced, but discomfort can be reduced to a minimum if the procedure is carried out expeditiously.

As the armlet is deflated, the sounds heard over the brachial artery change both in quality and intensity. The first sounds to be heard during decompression are a regular series of dull thuds. These constitute the "first phase" arterial sounds. They are succeeded in the "second phase" by sounds which are blurred and have more the character of a murmur. These in turn are followed by the clear loud sounds of the "third phase" which progressively increase in intensity as decompression proceeds, and eventually diminish, at first slowly, then abruptly. The sounds of the "fourth phase" differ from those of the "third," not only in intensity but also in quality, instead of being clear and sharp they are dull and muffled. The "fourth phase" is usually a short one and with a further fall in pressure of only a few millimetres the sounds die away.

The *auscultatory method* of estimating blood pressure depends on the change produced in the form of the pulse wave by the application of pressure to a segment of the brachial artery. As the compressing pressure falls below systolic, the pulse beats distal to the armlet increase in strength and, when the compressing pressure is slightly above diastolic, the pulse acquires a water-hammer character. When the compressing pressure falls below diastolic the water-hammer character is suddenly lost. During the third phase of decompression when the pulse is of the water-hammer type the arterial wall is set into violent vibration and loud sharp sounds are heard on auscultation, but when the pulse resumes its normal form the sounds once more become muffled.

Occasionally the arterial sounds become faint or even die away during the second phase of decompression to reappear after a further fall of 10 or 20 mm. Mistaken readings of the systolic pressure due to this so-called "silent gap" are avoided if an initial reading be taken by palpation.

A difference of opinion exists regarding the stage of deflation of the armlet which represents the diastolic end-point. In the United States it is customary to take the disappearance of the sound (i.e., the transition from fourth to fifth phase), but in Britain most cardiologists agree that the transition from the loud sharp sounds of the third phase to the quieter and duller sounds of the fourth phase is the correct reading. The former is less liable to cause error when the observer is inexperienced, but the latter is physiologically the more correct.

In patients with aortic regurgitation, loud sounds may be audible throughout the whole range of decompression. This renders estimation of the diastolic pressure difficult, the end-point being represented merely by a change in tone without any striking diminution in intensity of the arterial sounds. Conversely, in patients with pure aortic stenosis, the arterial sounds are audible only over a very limited range, which may be no more than 15 or 20 mm. In these circumstances the auscultatory method of estimating the diastolic pressure breaks down, but the systolic pressure can be determined by palpation.

PULSE RHYTHM—The final court of appeal for the cardiac arrhythmias is the electrocardiograph, but the common types of arrhythmia can generally be recognized by palpation of the pulse.

NOTES AND QUERIES

CATARRHAL SINUSITIS

QUESTION—I seem to be seeing many patients with sinusitis following "colds." I am not satisfied with the results of inhalations, and I wonder if there are other means which I can employ? Are sulphonamides of any use?

REPLY—A large proportion of the cases of acute nasal sinusitis following "colds" (acute catarrhal infection) in the autumn are caused by the pneumococcus. Rest in bed in the propped-up position and the administration of sulphapyridine, in addition to the steam inhalation of menthol and benzoin, are usually successful. The middle meati of the nose are painted with a solution of 20 per cent cocaine to which a few drops of adrenaline inhalant has been added. This application, which shrinks the mucosa and allows the escape of mucopus, can be made once a day. Pain is relieved by Tab codain or Dover's powder and aspirin. If the pain and temperature do not disappear within a week and thick mucopus is seen in the middle meati the sinusitis is often localized to one or both antra. If one or both antra are opaque to transillumination and there is no improvement after a few days of the above treatment the antrum should be punctured with a trocar and washed out with warm boracic lotion.

EDWARD D. D. DAVIS, F.R.C.S.

TREATMENT OF TAPEWORMS

QUESTION—Can any expert help me about the treatment of tapeworms in a child of five years? I have followed directions regarding filix mas, but have twice failed to get the head.

REPLY (from an expert in tropical medicine)—No preparation can be regarded as infallible. The most effective remedy, sponsored by Mapleson and others, is carbon tetrachloride, with which a cure rate of 75 per cent is claimed. For a child of five, of approximately normal weight, the dose is ten minims. The drug may be given emulsified in skimmed milk or, preferably, shaken up in half an ounce of saturated solution of magnesium sulphate. In the former case a dose of magnesium sulphate should be given two hours after; in the latter, only if necessary, four hours after administration. Mixtures should be prepared immediately before administration and the drug must, of course, be pure. It is usual to give the dose in the early morning after a light supper, but in the case of delicate children it may be preferable to give a light carbohydrate meal some three hours in advance. Afterwards a meal, chiefly carbohydrate, may be given as soon as the bowels are evacuated. Repeat-doses, in case of failure, should not be given until at least fourteen days

have elapsed and, provided that the first dose has been well tolerated, the second dose may be advanced to twelve minims. The drug is usually well tolerated by children, but toxic symptoms, ascribed to idiosyncrasy have been recorded. The following precautions should be observed—

There should be no starvation and the urine should be free from acetone. The child should be in approximately good health. A preliminary diet is given for a few days, rich in carbohydrates, protein and calcium but low in fat. Fat and alcohol are avoided in any form for a few days after treatment.

If there is evidence of a simultaneous *Ascari* infection, this is first treated with hexylresorcinol. Hexylresorcinol has also some action against tapeworms, is of low toxicity but is less effective than carbon tetrachloride. The dose for a child of five is two hard-coated capsules, each of 0.2 gm.

VITAMIN E AND REPRODUCTION

QUESTION—At a recent lecture to the troops on vitamins it was stated that the absence of vitamin E in the diet produced "degeneration of sex organs resulting in sterility and impotence." It was further stated that this vitamin is totally lacking in the food of the majority of people. This statement has caused great alarm and despondency, and there is a strong demand for the supply of watercress and fresh lettuce, which were the only articles of diet mentioned on a printed form as containing vitamin E. Could some expert tell me whether the statement is correct?

REPLY—The two main statements contradict each other. It is notorious that the human race reproduces itself. Further, the poorest groups of the population, whose diet in Great Britain is more devoid of vitamin E than that of any other class, have more children than the rest. It is stated that the poorest twenty-five per cent of the population produce half of the next generation. The explanation is that the original work on vitamin E is true of the animal used for experimentation—the laboratory rat. It is true that some veterinary surgeons believe vitamin E to be useful in treating repeated abortion, and some gynaecologists say the same of the human race, though others maintain that good advice given to the pregnant woman is as effective as vitamin E. This can hardly be true, though, of the cow. Your reader is, however, encouraged to persist in his demand for watercress and lettuce, but not for the reason given. Watercress is good as a source of vitamins A and C and of calcium and iron—all often deficient in an institutional diet, and lettuce is useful as a source of vitamin A.

V. H. MOTTRAM, M.A.

PRACTICAL NOTES

SULPHAMETHAZINE A CLINICAL STUDY

order to test the toxicity of sulphamethazine and the incidence and severity of urinary complications, P. O. Hageman, C. G. Harford, S. Sobin and R. E. Ahrens (*Journal of the American Medical Association*, October 9, 1943, 13, 325) have carried out investigations in a series of 103 patients. The series included thirty-seven meningococcal infections, sixteen pneumococcal, fifteen streptococcal and four urinary tract infections, and thirty cases of miscellaneous disease (including gonococcal and aphyllococcal infections). No patient had been previously treated for the current illness with any other sulphonamide. The drug was given an initial dosage of 4 gm. (orally when possible) followed by 1 gm. eight-hourly. In severe cases the initial dose was up to 8 gm. with eight-hourly maintenance doses of 2 gm. It was planned to force fluid intake to 3,000 c.cm. in twenty-four hours in order to obtain a urinary output of 1,000 c.cm. or more in twenty-four hours. In some cases this could not be adhered to owing to shortage of hospital personnel. Blood concentrations were measured at least every twenty-four hours, just before the administration of the eight-hourly dose. Urine examination was carried out daily. In the meningococcal group there were five deaths, all elderly patients with complications; in the other cases there was rapid improvement. This group included three pregnant women, all of whom recovered without apparent injury to the fetus. Uniformly good results were obtained in the pneumococcal group, only two patients had bacteraemia. There was one death in this group, a patient with meningitis and bacteraemia. In the streptococcal group there was one death, a patient with complicating diabetes mellitus. The results in the urinary tract infection group were also satisfactory, and there was no incidence of bacteraemia and no deaths. In the group of miscellaneous diseases the results were comparable with those observed with sulphadiazine therapy. The investigation showed that sulphamethazine is rapidly absorbed from the gastrointestinal tract and rather slowly excreted by the kidney. Adequate drug levels could be obtained by eight-hourly maintenance dosage. Tolerance to the drug was good. As regards toxicity and hypersensitivity (drug fever and rashes), the incidence was about the same as observed with other sulphonamide derivatives. Kidney and urinary tract complications occurred

more frequently than was anticipated. Crystalluria without haematuria occurred in 6.8 per cent. of all patients, in all instances the complication was benign. Haematuria occurred in 3.7 per cent. (all but one of these patients had meningococcal meningitis and received large doses of the drug). Post-mortem examination in one case without haematuria or crystalluria showed concentrations of acetyl-sulphamethazine in both ureters. Large amounts of the drug had been administered and the fluid intake had been sub-optimal. In conclusion, the authors state that the results show that less sulphamethazine is needed to procure blood levels comparable with those obtained by the use of other sulphonamides. The fluid intake was unfortunately lower than planned, and this may have had some effect on the urinary complications. But it is of interest to note that each case of haematuria subsided without evidence of embarrassment of kidney function. Taken as a whole, and in view of the fact that the circumstances under which the drug was administered in many cases were such as to offer excellent opportunity for urinary complications, it seems probable that sulphamethazine produces fewer renal complications than sulphathiazole and sulphadiazine.

SLEEP CONTROL IN THE TREATMENT OF MIGRAINE

In an article dealing with the interrelationship of sleep and migraine, M. Gans (*Palestine and Near East Medical Journal*, May-June 1943, 2, 97), on the basis of the theory that in susceptible persons attacks of migraine frequently followed heavy, deep sleep, has instituted a method of sleep control or "sleep diet" with obvious success. Any sleep during the day is strictly prohibited, as a substitute the patient is allowed one or two rest periods of fifteen minutes, sitting comfortably in a chair with closed eyes. At night a separate room is necessary with specially trained personnel. The patient is carefully watched by the nurse at regular intervals, and at the slightest sign of falling into deep sleep (such as unnatural body posture, sinking back of head, snoring), he is touched lightly; whereupon he instantaneously returns to superficial sleep level. If necessary the procedure can be repeated, and if sleep should become too heavy the patient is roused completely. The optimal period of sleep for migraine patients is six-and-a-half hours. Soon after the institution of the sleep diet the patients

NOTES AND PREPARATIONS

NEW PREPARATION

SULPHAMIDO-UREA—It is claimed for this compound of sulphanilamide and urea that by its use sulphonamide inhibitors are counteracted, bacteriostasis is increased and the severity of toxic reactions much reduced. Sulphamido-urea is issued in the form of tablets of 0.5 gm., price 2s and 3s 9d per 50 and 100. The compound will also be available shortly in powder form for use in pyodermatoses and the local treatment of wounds. The manufacturers are the Watford Chemical Co., Ltd., 50 South Audley Street, London, W 1, from whom literature and samples for clinical trial can be obtained on application.

INSULIN COLOUR CODE

As the result of cooperation between the manufacturers of the different insulin preparations (Allen & Hanburys Ltd., Boots Pure Drug Co., Ltd., The British Drug Houses Ltd., and Burroughs Wellcome & Co.) a standardized design for all British-made packings has been agreed upon, thus enabling ready identification of the type and strength of the insulin by means of distinctive colour schemes and the unit strength displayed in bold figures on both label and carton. An explanatory card, printed in colours, can be obtained from any of the manufacturers concerned.

CALFOS LTD DIARY, 1944

A LIMITED supply of pocket diaries for 1944 are available to practitioners on application, enclosing a penny stamp, to Calfos Ltd., Imperial House, 15-19 Kingsway, London, W C 2.

BOARD OF REGISTRATION OF MEDICAL AUXILIARIES

THE 1943 editions of the Registers of Chiropractors and of Speech Therapists have just been published, and copies can be obtained free by medical practitioners on application to the Acting Secretary, the Board of Registration of Medical Auxiliaries, British Medical Association House, Tavistock Square, London, W C 1.

THE BRITISH PHARMACOPEIA, 1932 AMENDMENTS

A NOTICE of amendment to the British Pharmacopœia, 1932, which has been sent to the London, Edinburgh, Belfast and Dublin Gazettes, draws attention to certain changes in and dispensing of formulæ, necessitated by war-time conditions. *Confection of sulphur*—the tincture of orange may be omitted. *Liquid extract of colchicum corm*—in dispensing, the seed may

be used in place of the corm. *Liquid paraffin*—this is the most important from the practitioner's point of view, as the other amendments chiefly concern the pharmacist. The American paraffin, which is now often employed, is likely to become misty if kept in too cold an atmosphere, it is therefore advised that such liquid paraffin be kept in a warmer atmosphere than heretofore.

OFFICIAL NOTICES

Vitamin and Iron Supplements for Children under 5 in Public Elementary and Nursery Schools (Administrative Memorandum no 485) draws attention to the facts that cod-liver oil and orange juice are available to all children under the age of five in full-time attendance at public elementary, nursery and other day schools, these allowances being in addition to those obtainable on the children's ration books and not necessitating the surrender of coupons. Ferrous sulphate tablets will also be made available for administration to children under five attending nursery schools, particularly war-time nursery schools. This administration is to be on the advice of the medical officer in charge only, and on the application of the Authority to the Senior Medical Officer of the Ministry of Health the tablets will be supplied in tins of 1,000, free of charge to both authority and parents. *Sex Education in Schools and Youth Organizations* (Educational Pamphlet no 119) issued by the Board of Education deals with the important subject of sex education for the elementary school child, through the different stages to the student at the training college. This little pamphlet gives much useful advice concerning the instruction of the innocent, the ignorant and the misinformed. Copies can be obtained from H M Stationery Office, price 6d.

CONTENTS FOR FEBRUARY, 1944

DISEASES OF THE EYE

Eyesight and Glasses? By N. Bishop Harman, M.D., F.R.C.S.

Some Diseases of the Eye Met With Abroad. By A. F. MacCallan, C.B.E., M.D., F.R.C.S.

Tuberculosis of the Eye By Professor A. Sorsby, M.D., F.R.C.S.

Contact Lenses By F. A. Williamson-Noble, F.R.C.S.

Orthoptic Treatment By Mary Pugh, M.R.C.S.

The Interpretation of Physical Signs II—In Lung Disease By M. Davidson, D.M., F.R.C.P.

EYESIGHT . . . AND GLASSES

By N BISHOP HARMAN, M B, F R C S

Consulting Ophthalmic Surgeon, West London Hospital

WHY do we wear glasses? Who is there amongst us who wears glasses all day long, or uses them when doing close work, who would not do anything that might be possible to relieve himself of the necessity of wearing glasses? What a wonderful asset is perfect sight! What a wonder is the ability to see with open eyes all the views in the distance, and also near to, with perfect distinction of detail! What a wonder also, is the power to read the finest print of books and newspapers in these days of inevitable small print! But some of us can only achieve this vision with the aid of glasses, and we find these are an amazing blessing, even though lenses have edges that limit our field of vision, and bridges that mark our noses! Why cannot we adjust our eyes to see with perfection without such aids as spectacles? That is the question put to us by some folk nowadays by the revival of the fantasy of Bates in the curious book of Aldous Huxley

Huxley's ideas can be dismissed at once, in his youth he had a serious bodily disease, and it affected his eyes. The corneæ of his eyes, the watch glasses of the eyes, were spotted all over inside with dots of inflammatory lymph, *keratitis punctata*. His sight was as is seen when on a frosty morning an attempt is made to look out of the bedroom window. Vision is impaired because the inside of the glass is covered with a haze of fine misty dots of moisture. The window can be wiped clear at once, but it takes years to absorb inflammatory spots from the inside of the cornea. Huxley thinks fantasies absorbed the dots, and did not know it was nature striving to give him health. Sympathy may be expressed with Huxley, but no one should risk following his distorted ideas

But there are far wider problems than this. We wear plus lenses, minus lenses and lenses that are parts of cylinders. Why do we need these? The answer is —because of the shape of our eyes. Again, it may be asked "is it possible so to alter the shape of our eyes that we can see perfectly without glasses?" The answer is "No!"

CAUSES OF DIFFERENT EYE SHAPES

The eyes are wonderful organs. They are set within the hollow cavities of the orbits, within a slippery sheath, and gently padded with fat. There are delicate muscles outside the globes that move them this way and that with amazing accuracy. There is not any real fixation of the eyes to the orbit. The nerve is slack, the conjunctiva is loose, the sling beneath each eye does not hold it. Yet the two eyes work together with surprising accuracy. Perfect eyes, that is, eyes that have perfect focus, are few. The finding of a perfect eye on examination by every test is always of interest. Eyes differ in shape. Most are a little too small from front

to back, and some are a little flattened so that the curvature is not true. Other eyes are too long from front to back. The small eye is commonly called hypermetropia; the oddly shaped eye astigmatic, for it has no focal point near or far. The large eye is myopic. The differences in individuals' eyes are anatomical characteristics. Most people who have hypermetropia or astigmatism are born with these imperfections. But myopia comes as the child grows up, it is due to some weakness of the white coat of the eye, the sclerotic. After middle age, disability to read without glasses, or presbyopia, is due, not to any change in the shape of the eyes, but to the hardening of the crystalline lenses. The lenses are most elastic and therefore most adjustable by the focusing muscles in youth, but with the increase of age there is a steady increase of the hard nucleus of the lens, so that the power of adjusting its shape is lost, it becomes hard, and relief of the loss of power to adjust the focus of the lenses inside the eyes can only be attained by putting the necessary lenses outside the eyes.

Now comes the question so often asked by some people nowadays—Will any sort of eye exercise improve the condition of the eyes, and really alter their shape so that eyesight becomes so sharpened that glasses are no longer needed? To get an answer to this question it is needful to understand why the shapes of individuals' eyes differ—why some are born far-sighted and others astigmatic. There appears to be no doubt that eye shape is associated with head shape. It is difficult to prove this in man, for the differences are so small. But if the eyes of other creatures are examined, particularly fishes, it is clear that eye shapes and orbit shapes vary with head shapes.

Fish whose bodies are flat from side to side, sometimes oddly flattened, such as John Dory, show this. One of these, known as *zeus faber*, I examined. Its eye is a discoid bulb, more the shape of a button than a marble. The measure of the eye from side to side was 26 mm. and yet the measure from front to back was no more than 9 mm. Why should these fish have such oddly shaped eyes? The answer is that if they had round spherical bulbs these would obtrude from their bodies and speedily get damaged. That extreme illustration is the indication of the reason for variation in human eyes. There is another illustration that fishes give of a most surprising order. We all know the pleuronectids, the "flat fish," soles, plaice, turbot and so on. These when young swim on an even keel, then ground feeding makes their bodies turn flat to the ground. The bones of the skull are twisted so that the under eye gets to the top surface. So when full grown the fish have two eyes on the top side, which sit up like two small conning towers and look forward together like the eyes of a man. Their eyes most astonishingly can be rotated inwards as much as one-eighth of a circle. All fish have a small slip of muscle called the superior oblique, but in the vast majority it is only a mere straight slip. On dissecting these flat fish I found an astonishing development of this muscle—a lengthy slip of it passed right over the top of the eye-ball, so that it could rotate the eye, just as can the human superior oblique.

So much for the evidence of the linkage of head and eye shape and eye equipment. Human eyes are nearly perfect spheres—the orbits are so well arranged for bulbous eyes—yet there are imperfections linked with variations of head shapes. There is no rule in this, but there is not any doubt of the connexion with hypermetropia and astigmatism. Short-sight or myopia is not apparently connected with head shape, but is due to a weakness in growth of the main coat of the eye-ball so that the normal inward tension of the eye-ball tends to stretch it, and with stretching there is increasing weakening; thus myopia may be progressive, and dangerous to sight. The fact that head shape and eye shape, seen so grotesquely

fishes, are to be found in an infinitely delicate fashion in man is in reality the answer to the question "will any sort of exercise benefit our eyes and enable us to do without glasses?" The answer is "NO!" A plain unqualified NO! It is impossible to alter the shape of our heads. We cannot change the shape of our noses. Can anyone by any exercise or fantasy of thought change an ugly snub nose to a delicate straight nose or a bold Wellington nose? If a man has a nose twisted by accident a skilful surgeon by a delicate and clever operation can straighten it, but that is no "exercise" it is surgery. If the error of the eye is gross, eye surgeons are to operate on occasion, but that is direct action, and no fantasy or exercise.

EYE TRAINING

Myopia—But there is another aspect of exercise. The word in its Latin origin means "to drill, train, to practise, to follow employment." This can be done for eyes which need such treatment. Early in this century investigations were started in London on the eyesight of children in the elementary schools. I published returns of 2,500 London school children who had poor vision. 68 per cent. were hypermetropic, and 32 per cent. myopic or short-sighted. These defective children represented about 10 per cent. of the school population, thus it followed that some 3 per cent. of the children were myopic. When the cases were plotted down according to the age of the children it was found that there were very few short-sighted children in the younger years, but a steady increase right through the school years to the leaving age. These were the percentages—

Age in years	4	5	6	7	8	9	10	11	12	13	14
Myopic (per cent.)	0	2	8	12	20	24	33	40	49	52	65

These figures show well the character of myopia, it comes on during school life, and increases in frequency and in degree with each year of school age. The obvious danger to highly myopic children of normal school work, even with proper correcting glasses, led to the formation of "myope classes", there the children were exercised. They were drilled and trained how to use their eyes to save them. Writing was done on blackboards, and also drawing, and arithmetic, big prints were displayed, manual work was taught as the pivot of thought, and drill, games and dancing given to improve their health. These classes were such a success that they were copied widely, and the Americans called them "Sight Saving Classes"—a good name!

Squint—Can other exercises be used with advantage? Yes, in squint cases. The error of vision is corrected under atropine, glasses are ordered to correct the discomfiting error. Sometimes the glasses straighten the squint; if they do not then orthoptic treatment with stereoscopic exercises is carried out with care to try to regain the normal interaction of the disturbed external eye muscles. Some cases respond, others need operation to adjust the muscles to the correct position. But glasses are imperative.

PERSUASION

Exercise is sometimes held to be persuasion. The effect of persuasion is sometimes amazing, but it is always mental. I remember well one of my earliest experiences of this effect.

I was asked to visit a certain well-known school for blind boys, and to report on the conditions and the possible improvement of their eyes. One boy, aged thirteen years, came to me in due course for a preliminary examination. I found no defect in his eyes. Then came the morning interval for the boys, they went into the playground to play football, mostly by shuffling about. I sat behind the window curtain to see and not be seen. The boy I saw played by sight. Next day I had him up at hospital. A complete examiner showed no eye defect. Then I stood him 6 metres from the Snellen test. He said he saw nothing. I thereupon put +10D sphere before each eye. Again he said he could not see. Then I put -1D sphere, then -2D, -3D, and so on before the plus ten sphere, until this was reduced to +1D sphere, and he began to read the letters on the test card. When he had +10D and -10D spheres before each eye he read 6/6, the standard vision. I said to him "Well, my boy, you can see well." He replied "Yes, but look at the big glasses I need to see with." So I showed him the marks on the lenses +10 and -10 which showed that although these lenses were big the effect was 0. I saw his answer on his face. Later inquiry showed why this boy persuaded himself to be blind. He had an elder brother who was blinded at birth. He had been in this blind school. The younger brother was so impressed with the reports of the excellence of the blind school he determined to go there also. He persuaded himself he was blind, and some others who admitted him to the school, but by a normal trick I was able to persuade him that he could see, and did see. The final persuasion was without doubt based upon facts, and not upon fantasy.

There is a lesson in that story familiar to all ophthalmologists, or eye-doctors. We always try to explain to a patient the condition of his or her eyes in words they can understand, and by drawings and diagrams that make these conditions plain and easy to understand. It is highly important, so far as is possible, to avoid technical terms and to use plain English words. But there are some conditions for which only technical words can be used. When this is so then a plain meaning should be given.

Recently I saw a very old lady, and she said she had been told years ago that she had astigmatism. It was evident that the word impressed her and she did not know what it meant. So I said that word means something simple. It is Greek " α " meaning not, and "stigma" meaning point. So astigmatism means only that the eye because of its shape has no exact focus, but a glass will correct it. She at once said "I wish I had known that all these years!"

EXPOSURE TO SUNLIGHT

The recommendation or assertion that sight may be improved by exposure to the sun—*looking at the sun*—is a clear indication of the folly of those folk who assert their knowledge of the best treatment of man's eyes. Nature shows most emphatically that looking at the sun, or any other brilliant light, is a danger, for the reaction of the eye is instantaneous, to shut out this brilliant light. The pupils contract as sharply and as closely as they can so as to reduce to the utmost the entry of excessive light into the eye. The danger and damage of such eye exposure is well known. Just a swift glance at the sun or a bright light is nearly blinding; the eyes see a great dark blot within them which is projected upon any white surface. And, alas, on some occasions that dark blot in the one reading point of the retina has been permanent. The macula of the eye, the one point of the retina which gives us fine detailed vision, is so damaged that it is lost. I have seen such damage in patients who have been careless in looking at a sun eclipse, and in those who carelessly looked at the intense electric welder blast in a factory. Even a moment of such exposure may blind an eye. It then should be thought of the recommendation of the "no glasses dictators," folk should look at the sun as an exercise? I had the answer years ago.

An Indian of some distinction came to me as a patient. He told his history. One par-
mazed me. He said that at midday he always looked at the sun, for he felt it improve
his sight. When I examined his eyes the answer was found immediately. His lenses were
so opaque that the keen electric ophthalmoscope gave no view of the fundus of his eyes.
His lenses had senile cataract of a sclerous type, a general haze which made his vision so dim
that he thought he was always looking through ground glass, so looking at the sun was
seeing more light, and it gave him pleasure.

To healthy-eyed patients, whatever their refraction, the only sane and safe
advice is to avoid looking directly at the sun or any intensely bright light.

BLINKING

The suggestion that blinking, conscious blinking of the eyelids, and eye movement
right and left or up and down improve sight is a sheer fantasy. While man is awake
his eyes, normal eyes, quite unconsciously of thought, are constantly on the move
as he walks, rides, reads, and works. No other part of the body works so constantly
except the heart. To suppose that blinking is a conscious exercise shows the
ignorance of the suggestors! I have watched many folk and counted their rate
of blinking.

At a recent meeting of distinguished medical men in the Council Chamber of the British
Medical Association I sat in such a position that I could watch the eye blinking of my
colleagues without their knowing that I was watching them. There were twenty-two men
near enough to count against my stop watch. All were in the fifties or sixties, and in keen
active life. The variation in the rate of their blinking was great. Those with under ten blinks
a minute numbered 3, the tens numbered 4, the twenties 6, the thirties 6, and those
who blinked at a rate over forty a minute numbered 3. I noted the high rate was in those
who had travelled long distances that morning, the low rate in those who lived near, and
also when they were keen on some part of the discussion.

Travelling myself that day I saw two first-rate examples of this blinking control. A lady
of sixty with her reading glasses was concentrated on a book of psychology; minute after
minute she did not exceed six blinks a minute. When we neared the terminus she put
away her book and glasses, and her blinking rose to over twenty a minute. The other
was a big stout man of the same age appearance, he was wearing plus bifocals, when he
took his seat his blinking exceeded fifty a minute, then he read his newspaper and the rate
dropped to twenty-five, after five minutes he shut his eyes and had a nap. He was tired.

There is no doubt that concentration of mental thought and sight reduces
blinking; as an exercise it is foolishness, for we are always blinking when awake.

But there are forms of "exercise" that I find good, and which I often recommend.
The eye lens and cornea and the delicate retina have no blood inside them, they
depend upon the lymph extruded from the blood vessels. If this circulation can
be increased it is possible in some cases to improve the sight or working of the
eye. I find this so in elderly patients who show early lens changes which may
in years to come lead to cataract. (It is well never to use this word to patients
as describing early lens changes—it alarms them.) The exercise I order is hot
bathing. At night, before bedtime, sponging the *closed* eyes with water as hot
as the hands will bear improves greatly the circulation of the eyes. I also find that
hot bathing increases the speed of adaptation to night darkness.

THE VALUE OF GLASSES

There is an excellent proof of the value of glasses for work, fine work, in the
experience of numbers of women workers of fine fabrics in factories. Thus work

I was asked to visit a certain well-known school for blind boys, and to report on the conditions and the possible improvement of their eyes. One boy, aged thirteen years, came to me in due course for a preliminary examination. I found no defect in his eyes. Then came the morning interval for the boys, they went into the playground to play football mostly by shuffling about. I sat behind the window curtain to see and not be seen. The boy I saw played by sight. Next day I had him up at hospital. A complete examination showed no eye defect. Then I stood him 6 metres from the Snellen test. He said he saw nothing. I thereupon put +10D sphere before each eye. Again he said he could not see. Then I put -1D sphere, then -2D, -3D, and so on before the plus ten sphere, until this was reduced to +1D sphere, and he began to read the letters on the test card. When he had +10D and -10D spheres before each eye he read 6/6, the standard vision. I said to him "Well, my boy, you can see well." He replied "Yes, but look at the big glasses I need to see with." So I showed him the marks on the lenses +10 and -10 which showed that although these lenses were big the effect was 0. I saw his answer on his face. Later inquiry showed why this boy persuaded himself to be blind. He had an elder brother who was blinded at birth. He had been in this blind school. The younger brother was so impressed with the reports of the excellence of the blind school he determined to go there also. He persuaded himself he was blind, and some others who admitted him to the school, but by a normal trick I was able to persuade him that he could see, and did see. The final persuasion was without doubt based upon facts, and not upon fantasy.

There is a lesson in that story familiar to all ophthalmologists, or eye-doctors. We always try to explain to a patient the condition of his or her eyes in words they can understand, and by drawings and diagrams that make these conditions plain and easy to understand. It is highly important, so far as is possible, to avoid technical terms and to use plain English words. But there are some conditions for which only technical words can be used. When this is so then a plain meaning should be given.

Recently I saw a very old lady, and she said she had been told years ago that she had astigmatism. It was evident that the word impressed her and she did not know what it meant. So I said that word means something simple. It is Greek " α " meaning not, and "stigma" meaning point. So astigmatism means only that the eye because of its shape has no exact focus, but a glass will correct it. She at once said "I wish I had known that all these years!"

EXPOSURE TO SUNLIGHT

The recommendation or assertion that sight may be improved by exposure to the sun—looking at the sun—is a clear indication of the folly of those folk who assert their knowledge of the best treatment of man's eyes. Nature shows most emphatically that looking at the sun, or any other brilliant light, is a danger, for the reaction of the eye is instantaneous, to shut out this brilliant light. The pupils contract as sharply and as closely as they can so as to reduce to the utmost the entry of excessive light into the eye. The danger and damage of such eye exposure is well known. Just a swift glance at the sun or a bright light is nearly blinding; the eyes see a great dark blot within them which is projected upon any white surface. And, alas, on some occasions that dark blot in the one reading point of the retina has been permanent. The macula of the eye, the one point of the retina which gives us fine detailed vision, is so damaged that it is lost. I have seen such damage in patients who have been careless in looking at a sun eclipse, and in some who carelessly looked at the intense electric welder blast in a factory. Even a moment of such exposure may blind an eye.

What then should be thought of the recommendation of the "no glasses dictators," that folk should look at the sun as an exercise? I had the answer years ago.

An Indian of some distinction came to me as a patient. He told his history. One part amazed me. He said that at midday he always looked at the sun, for he felt it improved his sight. When I examined his eyes the answer was found immediately. His lenses were so opaque that the keen electric ophthalmoscope gave no view of the fundus of his eyes. His lenses had senile cataract of a sclerous type, a general haze which made his vision so dim that he thought he was always looking through ground glass, so looking at the sun was giving more light, and it gave him pleasure.

To healthy-eyed patients, whatever their refraction, the only sane and safe advice is to avoid looking directly at the sun or any intensely bright light.

BLINKING

The suggestion that blinking, conscious blinking of the eyelids, and eye movement right and left or up and down improve sight is a sheer fantasy. While man is awake his eyes, normal eyes, quite unconsciously of thought, are constantly on the move as he walks, rides, reads, and works. No other part of the body works so constantly except the heart. To suppose that blinking is a conscious exercise shows the ignorance of the suggestors! I have watched many folk and counted their rate of blinking.

At a recent meeting of distinguished medical men in the Council Chamber of the British Medical Association I sat in such a position that I could watch the eye blinking of my colleagues without their knowing that I was watching them. There were twenty-two men near enough to count against my stop watch. All were in the fifties or sixties, and in keen active life. The variation in the rate of their blinking was great. Those with under ten blinks a minute numbered 3, the tens numbered 4, the twenties 6, the thirties 6, and those who blinked at a rate over forty a minute numbered 3. I noted the high rate was in those who had travelled long distances that morning, the low rate in those who lived near, and also when they were keen on some part of the discussion.

Travelling myself that day I saw two first-rate examples of this blinking control. A lady of sixty with her reading glasses was concentrated on a book of psychology; minute after minute she did not exceed six blinks a minute. When we neared the terminus she put away her book and glasses, and her blinking rose to over twenty a minute. The other was a big stout man of the same age appearance, he was wearing plus bifocals, when he took his seat his blinking exceeded fifty a minute, then he read his newspaper and the rate dropped to twenty-five, after five minutes he shut his eyes and had a nap. He was tired.

There is no doubt that concentration of mental thought and sight reduces blinking; as an exercise it is foolishness, for we are always blinking when awake.

But there are forms of "exercise" that I find good, and which I often recommend. The eye lens and cornea and the delicate retina have no blood inside them, they depend upon the lymph extruded from the blood vessels. If this circulation can be increased it is possible in some cases to improve the sight or working of the eye. I find this so in elderly patients who show early lens changes which may in years to come lead to cataract. (It is well never to use this word to patients as describing early lens changes—it alarms them.) The exercise I order is hot bathing. At night, before bedtime, sponging the closed eyes with water as hot as the hands will bear improves greatly the circulation of the eyes. I also find that hot bathing increases the speed of adaptation to night darkness.

THE VALUE OF GLASSES

There is an excellent proof of the value of glasses for work, fine work, in the experience of numbers of women workers of fine fabrics in

spatula is inserted under the lid and a horizontal incision is made through the skin 4 millimetres above the lashes. The upper edge is undermined for 2 millimetres, the lower edge is undermined as far as the lashes. The orbicularis is cleared away from the tarsus. A wedge-shaped strip of cartilage is removed from the whole horizontal extent of the thickened tarsus in one strip, thus—An incision of 5 millimetre deep perpendicular to the tarsus is made just above the roots of the lashes. An oblique incision is then made 2 millimetres above the first incision and the wedge included between the two incisions is removed, its base being between the two incisions. A thin layer of tarsal tissue only intervenes between the apex of the wedge and the palpebral conjunctiva. Removal of the wedge is begun from the outer side in each eye. If the whole cartilage is greatly thickened it may be shaved down. The sutures are now inserted. The needle must be entered through the lower skin-flap near to, but above the lashes, and in front of the cartilage. A horizontal bite of the cartilage close above the groove formed by the removal of the wedge is taken with the needle, which is returned through the lower skin flap 3 or 4 millimetres from its entrance. Four such sutures are inserted, the tarsus being deficient near the inner canthus, the horizontal bite is taken through the soft tissue which replaces it, as high up as possible. The wound is washed free of blood and the sutures are tied by a single knot with a double turn so as to lie horizontally. In the first instance the sutures should be loosely tied, and adjusted later their tightness being proportionate to the amount of eversion required. Excessive tightness causes strangulation and subsequent necrosis of the lid margin. The edges of the skin are drawn together with a continuous suture. A sterilized gauze dressing is applied and is not removed until the fourth or fifth day after the operation, when the sutures are removed and no further dressing should be required.

The border of the lid after healing has occurred will be thick and unsightly if any excess of cartilage is left below the wedge-shaped groove (MacCallan, 1937)

CONJUNCTIVA

Pterygium is a triangular encroachment of the conjunctiva on to the cornea, at its nasal edge, sometimes a similar encroachment occurs additionally at its temporal edge. Thus the condition appears on the part of cornea corresponding to the interpalpebral fissure. Its origin is due to irritation by wind and dust. If undisturbed the pterygium may become arrested spontaneously, but more usually it grows still further over the cornea, giving an unpleasant appearance or even in advanced cases interfering with vision.

Treatment is purely surgical. The neck of the pterygium is seized with toothed forceps, a squint-hook is forced underneath and the head is separated from the cornea. The head is then tucked under the conjunctiva and fixed there by a suture. Great care must be taken that the raw area left is not in contact with the conjunctiva, it should be touched with a drop of pure carbolic acid.

Pinguecula is a little yellowish elevation at the corneal margin in the same position as a pterygium, to which it is not related. It is not of any pathological significance, but may be removed if desired for the sake of appearances (MacCallan, 1937).

BACTERIAL INFLAMMATION—Inflammation of the conjunctiva may be caused by different bacteria, among which are the streptococcus, the staphylococcus, the bacillus of Koch-Weeks, the diplobacillus of Morax-Axenfeld, the pneumococcus, the gonococcus, and the diphtheria bacillus. Each of these organisms may cause an acute or a chronic conjunctivitis. The attack may start acutely or, beginning as a chronic inflammation, may develop into an acute condition.

In *acute conjunctivitis* the eyelids become hot and irritable, often suddenly. A slight discharge appears, first at the inner canthus, and rapidly increases in

mount. The conjunctiva at first shows a general injection of the superficial vessels, but this soon becomes more marked, and the membrane becomes œdematous. The eyelids become swollen and it may be difficult to open them. Any slight abrasion of the superficial corneal epithelium allows access of bacteria to the corneal tissue and an ulcer results. In severe cases a membrane forms on the surface of the conjunctiva owing to the rapid necrosis of the superficial cells (MacCallan, 1937).

Treatment should be started early if complications are to be avoided, and without waiting for a bacteriological diagnosis. Full doses of one of the sulphonamides should be given with the usual precautions, this may be sulphathiazole or sulphapyridine, four or five grammes a day for two days.

A 2 per cent solution of silver nitrate should be swabbed daily on the everted lids by means of a pledget of cotton-wool twirled round the end of a glass rod or a wooden match. If it is impossible to evert the upper lid, a canthotomy must be done. Thereafter the conjunctival sac should be irrigated every four hours with a weak antiseptic solution. A little ointment should be placed on the edges of the lids to prevent adhesion. If the practitioner cannot swab the lids with silver nitrate solution, the next best course is to drop into the conjunctival sac daily two drops of a solution of acriflavine in castor oil, 1 in 1,500. The greatest care must be taken to prevent injury to the cornea when the lids are manipulated (MacCallan, 1937).

In every case of a *mild inflammation of the conjunctiva* a careful search should be made in a good light for misplaced lashes. These may be removed with epilation forceps but they will grow again. They may be dealt with by electrolysis or diathermy if not more in number than two or three, if more than that Streatfield's operation is indicated.

It may be said that any case of *chronic conjunctivitis* for which no cause can be found and which resists treatment for three months should be carefully examined for signs of trachoma.

The treatment of chronic conjunctivitis is by the instillation into the lower fornix of the conjunctiva of some astringent drops, such as zinc sulphate or zinc chloride solution 0.25 per cent. If inflammation persists after a few days the conjunctiva of the upper and lower lids should be swabbed with solution of silver nitrate 2 per cent, in no circumstances should solid silver nitrate ever be applied to the conjunctiva. It is the duty of the practitioner before using any solution for the eyes which may be handed to him to assure himself that it is the correct one. Terrible damage to the sight has been known to occur as the result of instillation of caustic solutions by mistake.

On one occasion an ophthalmologist asked the attendant nurse to give him the copper sulphate stick for application to the conjunctiva of a patient with intractable trachoma. The nurse by mistake handed to him the silver nitrate stick, with which the ophthalmologist rubbed vigorously the everted lids. The result was complete opacity of both corneæ.

NON-BACTERIAL CONJUNCTIVITIS—The more common non-bacterial inflammations of the conjunctiva are follicular conjunctivitis, phlyctenular conjunctivitis, vernal conjunctivitis or spring catarrh, inclusion conjunctivitis, which includes swimming-bath conjunctivitis, and trachomatous conjunctivitis.

Follicular conjunctivitis is characterized by the formation of small round dots which are lymphoid aggregations in the subepithelial layer. These are often

the appearance of small bleb-like excrescences on the conjunctiva, especially on that covering the upper tarsal plate, the fibrous structure giving support to the lid with the orbicularis muscle in front and the conjunctiva behind. These blebs when massaged with forceps emit a gelatinous material consisting of broken-down cells. Some of them are dilated follicles and some are interpapillary cysts, for in all cases there is a papillary hypertrophy of the conjunctiva, as in all conditions of conjunctival inflammation.

Stage or type III is similar to type II but exhibits some cicatricial development, both of the conjunctiva and of the tarsal plate. The latter becomes thickened and causes slight ptosis. With increase of thickening the tarsal plate becomes slightly inverted, resulting in entropion. The hyperæmia of the lid margin leads to proliferation of the hair follicles and so trichiasis develops.

Stage or type IV visualizes a more or less complete cure, when the whole of the normal columnar epithelium is replaced by scar tissue epithelium. So much damage may already have been done to the tarsal plate and to the lid margins that both trichiasis and entropion may be present.

CLINICAL SIGNS—The many clinical signs of trachoma may now be enumerated, no one of which alone is pathognomonic of the disease.—

(1) *Neovascularization* of the upper fifth of the normally clear corneal tissue; this is called *pannus* when it is of naked-eye dimensions. Pannus means a cloth and it is ridiculous to refer to the cornea as being obscured by a cloth when it is only by optical magnification that the newly-developed vessels can be detected. Without such neovascularization no diseased conjunctiva can be labelled trachomatous. This vascularization is of course the invariable accompaniment of an inflammatory exudate into the substance of a cellular tissue, such as the corneal margin. Like the tarsal conjunctiva the bulbar conjunctiva is flooded with inflammatory exudate which spreads to the corneal margin, hence the neovascularization of tissue previously devoid of blood vessels. During the process of healing the inflammatory exudate is replaced by cicatricial tissue which may be observed as a greyish zone at the upper part of the corneal margin, this sometimes almost entirely obliterates the neovascularization.

(2) *Bleb-like excrescences* covered by œdematous epithelium on the upper tarsal conjunctiva, which on manipulation with forceps emit a gelatinous material.

(3) *Cicatrization of the upper tarsal conjunctiva* seen with the naked eye or perhaps only by using optical magnification.

(4) *Trichiasis* or *entropion* or both together.

(5) *A stiff upper lid*, that is to say on evertng the upper lid and removing the fingers the lid remains everted in an abnormal fashion.

(6) *Thickening of the upper lid* with or without ptosis.

(7) *A sinuous margin* of the upper lid.

(8) *Limbal follicles* are little rosettes at the upper periphery of the cornea. When these have cicatrized they present the appearance of little pits.

(9) *Superficial punctate keratitis* is a common accompaniment of trachoma in Egypt.

(10) *Corneal facets* or depressions, the site of former subepithelial follicles of the cornea

ETIOLOGY—The etiological cause of trachoma is a virus which attacks the epithelial cells of the conjunctiva, and when stained with Giemsa solution or other suitable stain can be detected under the oil-immersion lens of a good microscope. The technique of staining the virus is an art which has to be learnt from an expert.

The virus attacks no part of the human frame other than the ocular conjunctiva. Certain monkeys, after inoculation from a human infected conjunctiva, exhibit a disease which is comparable to the human disease but has considerable differences.

TREATMENT—The treatment of trachoma is a matter of great difficulty in view of the important changes which occur, not merely in the conjunctival epithelium and in the subconjunctival tissue but also in the tarsus. In psittacosis the virus can be found in fibroblasts as well as in epithelial cells and I have no doubt that this is also the case in trachoma on account of the remarkable fibroblastic hypertrophy which occurs in so many cases, though this has not yet been reported.

During treatment it is not uncommon for a drop of discharge from a trachomatous eye to enter the conjunctival sac of the operator who has neglected to protect his eyes with goggles. If this happens the conjunctival sac should immediately be irrigated profusely with a normal saline solution or with tap water, if the saline is not instantly available. The whole conjunctiva should then be swabbed with silver nitrate solution 2 per cent and the sufferer should undertake no further work during that day. In spite of such prophylaxis, infection has been known to occur. As an added precaution sulphathiazole may be given in two daily divided doses of five grammes; the usual precautions should be taken during the exhibition of this or any of the sulphonamides.

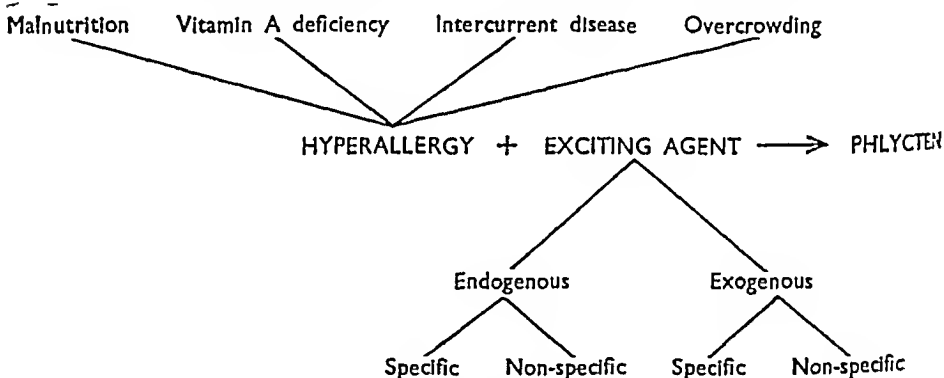
Sulphonamide treatment may be used in full dosage in trachoma exhibiting any hyperæmia or inflammation. It is useless to give small doses for a fortnight or so as this only renders the virus drug-resistant. The test of cure is the disappearance of virus inclusion bodies from conjunctival cells when examined from time to time after long staining with Giemsa. It frequently happens that scrapings of the conjunctiva taken on one day are virus-free, whereas on another virus bodies are found. None of the rapid methods of staining the inclusions are invariably reliable, for I have often obtained a negative result with them, when with the long Giemsa method inclusions could be seen.

When the virus of trachoma has attacked and gained entrance into one or more of the conjunctival epithelial cells it rapidly spreads to other epithelial cells and to the subepithelial tissue and so to the tarsus. One of the most striking effects of the disease is the effect of the virus in causing fibroblastic proliferation in the tarsus. When this process has begun, the application of caustics such as silver nitrate solution and of copper sulphate to the conjunctival superficies cannot be expected to be of much benefit, although no doubt it may keep down the papillary hypertrophy which invariably accompanies any form of conjunctival inflammation.

In *Stage or type I* the swabbing or painting of the conjunctiva with silver nitrate solution 2 per cent daily may be carried out. This is of value in the East

positive Mantoux reactions were obtained against an incidence of 15.3 per cent. in a control series of 900 cases of blepharitis. Whatever be the theoretical basis for other allergens as to the cause of phlyctenulæ, clinical evidence points to the tubercle bacillus as the significant agent in human phlyctenulosis. The difficulties that arise from this conception are not inconsiderable. In the first place, clinical evidence of tuberculous disease in children with phlyctenulosis is exceptional. Secondly, phlyctenular ophthalmia is uncommon in the course of tuberculous disease in children. Both these statements, whilst substantially true, do not, however, cover all the established facts. In the 592 cases of phlyctenulosis at White Oak Hospital, no less than 6.4 per cent (38 cases) had tuberculous lesions, against not one single case in the 900 controls. Furthermore, Siwe (1934) has shown that there is a distinctly higher incidence of phlyctenulosis in Mantoux positive children than in Mantoux negative (4.5 per cent against 0.26 per cent, respectively), and that the incidence of phlyctenulosis was nearly three times higher in Mantoux positive children under treatment for tuberculosis than in Mantoux positive children treated for lesions other than tuberculosis (6.6 per cent. against 2.8 per cent.)

TUBERCULOUS INFECTION + SUPERADDED DEBILITY from —



Scheme showing the probable development of a phlycten, illustrative of a non-specific allergic reaction in tuberculous infection

A whole series of additional evidence is available to implicate tuberculosis as the causative factor. It is enough to point to the family history and after-history of children with phlyctenulosis. Some 28 per cent. of a series of children seen at White Oak Hospital gave a positive family history against a computed rate of 3.7 per cent. for London children as a whole, whilst 5.3 per cent. of 754 children treated between 1921 and 1931 showed notifiable tuberculosis by 1936 against 0.8 per cent. in a control series of 1,024 children. The mortality rates from tuberculosis were 0.8 per cent. and 0.1 per cent. for phlyctenular cases and controls respectively. Such evidence as this warrants the conclusion that phlyctenular ophthalmia is the local expression of tuberculous infection. Most tuberculous infection runs a subclinical course towards recovery. In the case of the phlyctenular child that silent course is disturbed, either as a result of exogenous specific or non-specific allergens precipitating a spontaneous tuberculin reaction in the conjunctiva.

or as a result of a disturbance in the unstable balance between immunity and sensitization. That both these factors are operative is suggested by the frequency of phlyctenulæ in children living with adults with active tuberculosis, and by the graver prognosis as to the subsequent onset of tuberculous disease and mortality from tuberculosis in phlycten children as compared with Mantoux positive children as a whole.

MODIFIED NON-SPECIFIC REACTIONS

The complex processes of immunity and allergy probably also underlie a more ill-defined series of ocular lesions. If it is assumed that non-specific allergic reactions can occur in the tissues of tuberculous infected patients, and that this non-specific reaction may take different forms depending upon the balance between infection and immunity, the various histological pictures shown by the iris and ciliary body in *chronic cyclitis* become explicable. Chronic cyclitis and *iritis* are not uncommon, and etiological factors are not often established in any particular case. Some clinicians regard focal sepsis as an important exciting cause, but many others incriminate tuberculous infection. There is clinical evidence but no conclusive proof in support of either view, and no real assessment of the problem is as yet possible. It is likely that many etiological factors have to be considered, and what has been gained so far amounts to a recognition that the iris and ciliary body may respond to both the toxins of organisms and to the disturbances in the balance between sensitization and immunity.

Bearing on these difficult issues are such relatively uncommon, but intrinsically illuminating, affections as uveoparotid fever (Heerfordt's syndrome) and sarcoidosis (benign lymphogranulosis, Schaumann's disease).

In *uveoparotitis*, the uveal reaction, the enlargement of the salivary glands—especially the parotid gland—and the facial palsy are regarded with considerable validity as a tuberculous lesion. Giant cell systems have been found in the parotid tissue, but the full picture of a tuberculous reaction is none the less lacking.

Equally baffling is *sarcoidosis*, with its multiple manifestations. The nodules in the skin, the miliary reactions in the lungs, the rarefaction in phalanges and the occasional iris nodules all have histological features that suggest but do not quite conform to tuberculosis.

It is possible that all such manifestations are the expression of infection by an organism not unlike the tubercle bacillus, but it is also possible that they represent intermediate stages between the non-specific allergic reaction seen in phlyctenulosis at the one extreme and the specific and characteristic reaction in the caseating tubercle with embedded bacilli at the other. The solution of these theoretical puzzles is the first step towards the rational handling of a mass of relatively common but elusive disease processes.

References

- Berg, F (1940) "Modern Trends in Ophthalmology" (edited by F Ridley and A. Sorsby), London, 24-31
Savin, L. H (1934) *Trans Ophthal Soc U.K.*, 54, 549
Siwe, S (1934) *Acta Tuberc Scand*, 8, 224
Snapper, I (1938) "Pseudo-Tuberculosis in Man," Haarlem.
Sorsby, A (1942) *Brit J Ophthal*, 26, 159
Woods, A. C (1940) "Modern Trends of Ophthalmology" (edited by F Ridley and A Sorsby), London, 3-23

CONTACT LENSES

By F. A. WILLIAMSON-NOBLE, F.R.C.S.

Assistant Ophthalmic Surgeon, St Mary's Hospital, Ophthalmic Surgeon, National Hospital, Queen's Square, London

ALTHOUGH regarded as a modern discovery, it has been pointed out by Ida Mann (1938) that the first publication dealing with contact lenses was dated 1801

It concerned the use by Thomas Young of a home-made affair, consisting of a tube a quarter of an inch long containing water and closed at one end by a lens. The other was smoothed off with wax and applied to the eye. Nothing further was done until 1887, when Saemisch had a patient in whom the cornea was left completely exposed following an operation for malignant disease of the lid. He had a protective glass shell blown by Müller of Wiesbaden, which the patient wore with comfort and preservation of corneal transparency until his death twenty-one years later.

This patient was probably the first to wear a contact lens in the modern sense of the word and, despite the striking success attending its use, development proceeded slowly and it was not until 1911 that the obvious step of making a ground, as opposed to a blown glass, was taken by Messrs Zeiss. Such lenses are reputed to have been worn by German airmen in the last war, and there is an apocryphal story of a Zeppelin pilot who was shot down, fell several miles through the air, made quite a good hole in the ground, and broke every rigid structure in his body except the contact lens which was found intact on the eye-ball.

A-FOCAL SPHERICAL LENSES

Zeiss lenses were occasionally employed in this country from 1919 onwards but they suffered from two defects —

(1) The early types were a-focal, i.e. they had no lens and obtained their optical effect by variations in the radius of the corneal portion. This meant that in myopic

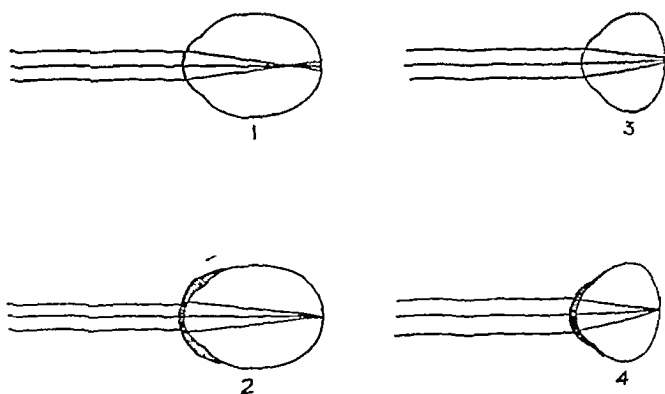


FIG 1 — (1) *Myopic eye* uncorrected, a parallel beam of rays come to a focus in front of the retina. (2) *Myopic eye* the curvature of the corneal portion of the contact lens is less than that of the actual cornea, thus diminishing the refractive power of the eye and allowing a parallel beam of rays to come to a focus on the retina. (3) *Hypermetropic eye* a parallel beam of rays comes to focus behind the eye. (4) *Hypermetropic eye* the curvature of the corneal portion of the contact lens is greater than that of the actual cornea, thus increasing the refractive power of the eye, and allowing a parallel beam to come to a focus on the retina. In both instances the space between the lens and the eye is filled with normal saline.

eyes, the corneal part of the lens had to be flatter than the actual cornea and therefore tended to press against it, in hypermetropic eyes, on the other hand, the curvature was greater than that of the cornea, thus leaving a space of variable depth, supposedly filled with saline but often with bubbles in it (fig 1) This defect was remediable by grinding a lens of the required power into the corneal portion, and this was done later.

(2) The scleral portion was ground to a spherical curve and consisted of a relatively narrow rim Trial sets of lenses were made up with various combinations of corneal and scleral radii from which it was possible to choose a lens which best fitted the eye, but this "best fit" was not necessarily an accurate one, and it was as a rule only in hypermetropic eyes that the glass could be worn with any degree of comfort. Strebel (1932) intimated that the edge of a Zeiss contact lens would fit only about 33 per cent. of individuals, the remainder showing too much scleral asymmetry, especially near the insertion of the internal rectus, for the lens to be worn with any degree of comfort It thus became obvious that some form of individual fitting of contact lenses was necessary, if success was to be achieved It also became obvious that as large an area as possible of the bulbar conjunctiva should be utilized to support the lens if comfort was to be achieved This again provided an indication for individual fitting since the eye-ball in its anterior half is very far from spherical, the shape varying from one individual to another

INDIVIDUALLY MOULDED LENSES

The ideal procedure would be to take a mould of the anterior surface of the eye-ball and to construct a contact lens, the internal contours of which conformed to this Various methods were tried, and Dallos perfected one by using a hydrophilic colloid, negocoll, which is liquid at approximately 106° F and therefore is not uncomfortably hot.

A thin glass shell of approximate fit is filled with liquid negocoll, slipped between the lids, and applied to the cocainized eye-ball The negocoll solidifies in three minutes and the shell containing it is carefully removed, a mould of its internal surface being then made with wax (hominit) and pieces of cotton-wool From this model of the eye-ball in wax a similar one in metal is reproduced, on to which glass can be pressed and a lens of the requisite shape thus made

Unfortunately, however, even a lens such as this is not a perfect fit, as in the process of taking the mould a certain amount of deformation of the soft conjunctiva is unavoidable, as even the slightest pressure of the eyelids is sufficient to distort the conjunctiva Nevertheless, contact lenses fitted in this way are a great improvement on spherical lenses and the method is widely used in the United States If a more perfect system of mould taking could be found, much of the expense and difficulty in making contact lenses would be abolished, but such at present is far from being the case, in fact, the modern tendency is to give up the taking of moulds altogether (see below) This has been rendered possible by the great accumulation of individually fitted contact "shells" (contact lenses without optical power), grouped systematically according to size, shape, depth and curvatures

Fitting of stock moulds —For an expert contact lens fitter it is a matter of a few minutes to pick out the best approximate fit from this collection, and the order of magnitude of inaccuracy is only a fraction of that resulting by moulding methods

(50–300 μ as compared with 1–3 mm.) To reduce and eventually abolish every noticeable difference between the surface of the eye-ball and the inner surface of the contact lens the patient is cocainized, the shell inserted, under the lids, and she is instructed to look first to one side, then to the other, and then up and down. Spots or areas of blanching of the bulbar conjunctiva indicate tightness, whereas hyperæmia and wandering air bubbles disclose comparative looseness of the fit. Gradually grinding away layers of glass (with a small grindstone) where the fit is tightest causes the area of contact to spread and the zone of loose fit to contract. In this stage it is practicable to make a plaster cast of the trial shell and scrape away the requisite small portions. A new contact glass made to this shape will probably have a much better or perhaps quite a perfect fit. To verify the accuracy of the fit by inspection and “palpation” (manipulation is perhaps a more adequate term) is anything but easy. It must not be forgotten that in order to examine any single sector of the eye-ball the patient has to look towards the other end of the same meridian thus hiding this latter hemisphere completely, and also the adjoining sectors, to a considerable extent. It is therefore possible to check up half meridians *only, one lever arm of the balance, not the whole*. The only way of checking up whether all opposite half meridians or sectors are in balance is to draw a horizontal line across the lens and see if this line stays in correct position as the eye moves. Some slight meridional lag, particularly in extreme positions, and some degrees of rotatory play around the antero-posterior axis are permissible and in some cases unavoidable. But a permanent turning of the axis indicates an imperfect fit and presages discomfort in wear.

It will thus be seen that the process of accurate fitting is an elaborate one and as many as twenty or more attendances may be required for a satisfactory result. It is really more of an art than a science and one which can be acquired only as the result of considerable experience. When a satisfactory fit—corneal and scleral—has been obtained, a copy is made in optical glass and the required correction ground into the corneal portion.

In the earlier lenses, this correction was always spherical and such is essential in the Zeiss model, since this is circular in outline and spherical in shape, and so may take up any position. Individually fitted lenses, however, will take up the position of optimum fit and remain fixed. It is therefore possible to grind a cylindrical correction and if necessary a prism, modifications which in certain cases bring about marked improvement in visual acuity and comfort.

INDICATIONS FOR CONTACT LENSES

After this rough outline of how contact lenses are made, the next thing to consider is their properties and the indications for their use.

From the optical standpoint, contact lenses have several advantages over ordinary spectacles —

(1) They move with the eye, a point which is of considerable importance when there is much difference between the refraction of the two eyes and when full field is essential. It is well known that there is no apparent displacement of objects when looked at through the optical centre of a lens. If, however, the direction

of gaze is not through the optical centre, displacement occurs owing to a prismatic effect (fig. 2) When there is much difference in power between the lenses of a pair of spectacles, this prismatic effect causes double vision directly the eyes move from the middle line and renders it impossible to wear the lenses with any comfort This is one of the reasons why patients who have had a monocular cataract removed cannot achieve binocular vision when wearing a suitable convex spectacle glass in front of the eye which has had the operation and no lens, or a very much weaker one, in front of the unaffected eye. With a suitably made contact glass, however, the eye is always looking through the optical centre of the correcting lens and diplopia is avoided, except perhaps in extreme positions, when the lens may slip a little over the eye-ball.

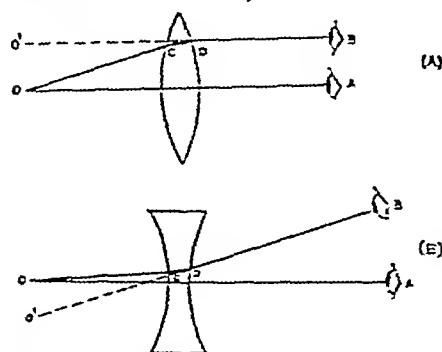


FIG. 2.—Displacement produced by a lens

- (A) Convex lens. Eye at A sees O in correct position. At B, the eye is looking through the edge of the lens, the two sides of which act as a prism and bend the rays of light along the path OCDB. The eye B imagines that light always travels in straight lines and therefore that O is along BD produced, i.e. at O' instead of at O, thus causing an apparent displacement of the object upwards.
- (B) Displacement produced by a concave lens. B projects the image along BD to O', and so has the illusion of its being displaced downwards.

ocular vision, whereas with the contact lens, where the images of the two eyes are more nearly equal in size, they are more easily combined.

In high myopia, this property is also of use, since an eye of, say, $-15D$ wearing a contact lens, has a 25 per cent. larger retinal image than with an ordinary spectacle lens and hence 25 per cent. improved visual acuity.

(3) When the surface of the cornea is not spherical or not spherically deformed, ordinary spectacle lenses are often of little use in improving vision. Examples of this are afforded by conical cornea, faceted corneal scars occupying the peripheral area and old mustard-gas burns. When a contact lens is worn, however, the thin layer of fluid between its posterior surface and the anterior surface of the cornea fills up the inequalities in the latter and enables the eye to form a clearer image. Occupational indications for contact lenses are fairly obvious, when it is borne in mind that their principal functions are—

- (i) That they afford protection to the eye and are almost impossible to scratch when *in situ*
 - (ii) They are prevented from fogging by the moisture of the tears,
 - (iii) They are invisible
 - (iv) They cannot be knocked off.
- They are thus suitable for the most exacting occupations in which they are used.

rain or steam, for swimming and probably for Rugby football. Curiously enough, however, contact lenses are of little value in occupations involving exposure to minute foreign bodies.

An example of this occurred in a carpenter to whom considerable annoyance was caused by sawdust getting in behind the contact lens, and necessitating its removal and cleaning at frequent intervals.

The same reason probably explains the discomfort felt by some wearers in a smoky atmosphere.

EYE IRRITATION

Apart from foreign particles and chemical irritants, there is irritation for which the contact lens itself is more or less responsible. The reaction of an eye to irritation is increased tear production and spasm of the orbicular muscle, also conjunctival hyperæmia, photophobia and discomfort or pain. Although a well-fitting contact lens will cause no mechanical irritation, some watering and a certain degree of increased tension of the eyelids is to be found, if not always noticed. After some time this has the effect of causing the contact lens to get in an even closer contact with the eye and, with this tightness causing more irritation and the irritation further muscular tension, a vicious circle arises which may end in acute discomfort. This is immediately relieved by loosening the lens on the surface of the eye, and not until it gets tight again will the glass cause any appreciable irritation. It will therefore be obvious that however accurate the fit, a certain routine should be followed in training the patient if successful wear is to be achieved.

ROUTINE TRAINING FOR WEAR

The first part of the necessary training is governed by the above considerations, but of course will be largely dependent on individual sensitivity and environment. Once the first "irritation" stage is successfully overcome, the next stage to face is the reaction of the corneal epithelium to prolonged wear of a contact lens. This is known as "Sattler's veil" and is in many ways analogous to that of prodromal glaucoma. Its onset is rather sudden and, at the beginning, varies from one-and-a-half to four hours after the insertion of the contact lens. At night, a halo of coloured rings around lights is noticed, or general mistiness in daylight. The veil disappears as a rule ten to thirty minutes after the removal of the contact lens. As it affects the sight only very slightly and has no other discomfort attached to it, people are inclined to ignore it and should be warned about wearing their lenses for much longer than one hour after the appearance of the veil, as a further increase of the corneal œdema may result in epithelial vesicles and consequent erosions. On the other hand, the veil will persistently appear at much the same time if the lenses are always removed immediately after its onset. To increase the periods of clarity, the best procedure is to wear the lenses for one hour after the veil appears and then remove them. Following this routine with the necessary perseverance, the daily wear can sooner or later be extended to twelve to sixteen hours. A mid-day break of one hour or so is, however, always advisable.

Experiments with a view to shortening the period of training of contact lens wearers have been made on various lines. I have mentioned the great improvement obtained by reducing the mechanical irritation to a minimum through exact individual fitting. Sattler's veil, however, is still a problem. With the older system, the contact lens depended for its optical effect on the fluid separating its posterior surface from the cornea, and the optimum pH and chemical composition of the fluid were the subject of extensive research, but no consistent results were obtained. It appears that the veil has less to do with the composition of the fluid outside than that within the cornea. The less interference there is with the physiological nutrition of the cornea the better will be the results, and thus is why accurate fitting, patient training and intelligent wear are of paramount importance.

PLASTIC LENSES

The question of using plastic materials for contact lenses is still *sub-judice*, and is the subject of active research. There is no evidence so far that the physical or chemical properties of plastics are superior to those of glass, but the likelihood of a contact lens being allowed to fall on the floor with consequent breakage, should never be lost sight of and, if for no other reason than the fragility of glass, a plastic should be substituted for it. Furthermore, there is the psychological factor which must be taken into consideration—the feeling of greater safety enjoyed by a wearer of contact lenses if those lenses were plastic instead of glass.

A wonderful future can be envisaged for contact lenses, and a time will doubtless come when ordinary spectacles will be worn little, if at all. This day has certainly not dawned yet, however, and there is quite a lot of work to be done before the use of contact lenses becomes at all widespread. Unfortunately, hastily fitted and badly made lenses are already being supplied to the public and serve to give this type of optical appliance a bad name. With the use of present knowledge, it is only by extremely careful fitting that a satisfactory result can be obtained. There must also, as indicated above, be a period of training the patient in how to use the lenses. If, in his enthusiasm, he wears them for too long at first, the result may easily be a failure. It is hoped that with the facilities which will exist for research after the war, advance will be more rapid than it has been in the last four-and-a-half years. There are several outstanding problems waiting to be settled, and this can only be done by extensive research work aided by a team of capable technicians, who have had adequate training in the making of contact lenses.

I cannot conclude without emphasizing the importance of the pioneer work carried out over many years by Dr J Dallos, and without thanking him for valuable suggestions in the preparation of this article.

References

- Mann, Ida (1938) *Trans Ophthal Soc U.K.*, 58, 109
 Young, T (1801) *Phil Trans*, 92, 23
 Strebel (1932) *Klin Monats Augenhel*, 89, 625
 Williamson-Noble, F A, Dallos, J, and Mann, Ida (1940) *Brit J Ophthal*, 24, 43

ORTHOPTIC TREATMENT

By MARY PUGH, M.R.C.S

Medical Officer, Orthoptic Department, Royal London Ophthalmic Hospital

ORTHOPTIC treatment includes all methods of treatment which aim at re-establishing the normal straight position of the two eyes and at developing the normal binocular vision which will keep the eyes in this position. The most obvious condition which calls for treatment is a squint which can be seen, the less obvious is a heterophoria which may later break down into a squint or, if not developing that far, yet cause eyestrain and considerable discomfort to the patient.

STRABISMUS

Squints are sometimes present at birth but more often occur after the eyes have been straight for some time. The majority of cases are noticed between the ages of two and five years. A much smaller number of children develop a squint between the ages of five and ten years, after this age the development of a concomitant squint without any previous history is unusual. Paretic squints fall into a different category entirely and may follow trauma or disease in later life, they will be discussed separately at the end of this article.

ETIOLOGY AND TREATMENT—At the onset of a squint, treatment should begin as soon as possible.

Refractive error squints—The etiology in approximately 50 per cent of cases will prove to be an error in refraction. This is corrected by suitable spectacles. These can be tied on the child by ribbon threaded through the specially made spectacle frames for babies. Children are often left several years without correcting lenses in the hope that the squint will right itself. Unfortunately this is unlikely to happen, as the child uses its eyes more as it grows older and emphasises the incorrect position of eyes with the increased visual effort.

Psychological squints—Another cause of the condition is psychological trauma and this accounts for between 10 and 20 per cent of the cases. The treatment here includes first a correction of any refractive error present, and secondly a careful investigation into the psychological background. This may not be easy, but it is essential. If the offending factor is found and removed the squint will in some cases disappear almost immediately; on the other hand, if the cause of emotional irritation remains uneliminated the squint continues and becomes part of the patient's emotional make-up, so that in later life the treatment is complicated by a third factor in addition to the anatomical difficulty of putting the eyes in the straight position and the physiological difficulty of developing normal binocular vision. Probably the most common of the psychological difficulties is jealousy. Combined with the imitative faculty of young children this accounts in many cases for the so-called familial tendency and is demonstrated rather well in cases of unidentical twins when one child has perhaps a marked anisometropia which has caused a squint, whilst the second child has emmetropic eyes and develops a squint later than the first child. Children may imitate each other for fun, but unfortunately

the "old wives" warning that "if the wind changes your eye will stick there" has some truth, the wind may be blameless but the internal rectus having been thrown into spasm by a trick continues to overact irrespective of its owner's wish. That shock, fear, unhappiness and any of the other emotional difficulties of childhood may lead to a squint is not so difficult to understand if it is remembered that normal human binocular vision is a late development of the mammalian visual mechanism. Parents and adults can by unwise remarks unwittingly help to make a psychological squint worse. The condition is akin to a stammer which may sometimes accompany it. Any remark which reminds the child of its abnormality will encourage the state of mind which tends to produce the squint, whether it is an exhibitionism or sense of inferiority. Orthoptic training may have to be delayed or discontinued if the necessary time spent on the eyes provokes psychological disturbance. Training is never of any use if the patient's mind is against the treatment and no amount of coercion will avail. Psychological adjustment must come before local training in these cases.

Squints from other causes—The etiology of the remaining odd 30 per cent may be the disproportionate strength of one or other of the ocular muscles, brought about either by the initial weakness of a corresponding muscle or an acquired weakness brought on by local trouble, such as trauma, infective illnesses or local inflammation. The covering of one eye for local trouble may, by throwing out the normal binocular "stance," produce a squint which is apparent on uncovering. If the eye has taken up a position of rest the deviation will be divergent, if the eye has been irritable and hypermetropia is present it will probably be convergent. Whooping-cough, measles, or any acute illness may act as the starting factor, but often the primary fault is an underlying weakness.

THE AIM OF ORTHOPTIC TRAINING

The aim of orthoptic treatment is to establish two eyes with full visual acuity in each, which will maintain a normal position at any required focus. Normal eyes have parallel visual axes when focusing at a range of thirty metres and approximately parallel down to a range of six metres. From six metres to reading distance of fourteen inches the visual axes must converge sufficiently to allow the image of the object of interest to fall on each macula. This is important, not only for the perfect functioning of the visual apparatus but also from the cosmetic point of view, especially at any range under six metres. If a patient is talking to a companion two feet away from him, his eyes will only look normal if the visual axes are converging equally towards his companion's face. If his visual axes remain parallel, his eyes will look divergent to his *vis-a-vis* or, perhaps more accurately, he will look as if he is thinking of something far away and not paying attention to the matter in hand. In brief, both eyes must be able to focus binocularly.

The first stage in the training is to develop the visual acuity in the weaker eye and this should be started as early as possible. If the weak eye does not fix centrally when the other is covered, or when the child is old enough to be tested on toys or charts, the difference of acuity between the two eyes is marked. A patch stuck on the face completely covering the stronger eye is the most satisfactory measure. Care must be taken to check the vision of each eye every month as the covered eye can become amblyopic in young children, although this rarely happens after the

the difficulties of work. Sometimes no actual deviation is present, but the power of convergence is much weaker than it should be. This means that after they have been converging on close work for some hours considerable strain is produced and the patient complains of being unable to carry on in the afternoon. Young adults form the largest group of these cases. As the fusion sense is well developed, orthoptic training can be used to improve the muscle balance and tone and the results are most satisfactory without undue time and trouble. Candidates for flying can often be brought up to the required standard in four or five weeks and they will maintain the standard after hard flying conditions. Some occupations predispose to heterophoria more than others. Any one-eyed work is likely to give trouble, be it microscope work, watch-making or any other work which necessitates the use of one eye with suppression of the other. Fine near work, such as draughtsmanship, may give rise to a worrying esophoria with headaches. After forty years of age exophoria is much more usual than esophoria, which is to be expected if it is remembered that convergence is linked to accommodation, and as the latter begins to fail so convergence deficiency becomes evident. The deficiency of convergence may be found at any age even in children, though much less often than in adults. The onset of the condition may be traced to some debilitating attack, such as influenza, typhoid or measles, and it suggests that the mechanism of the onset is that while the patients under these conditions are unable to amuse themselves normally they read more, but that as the eye muscles both external and internal are also affected by the general lack of tone an incorrect balance is established between the convergence and accommodation. This condition responds quickly to exercises if the general health has been restored. If on the other hand the patient is still not well, treatment of the eye muscles is unsatisfactory and convergency readings will tend to correspond to the degree of fitness.

SPECTACLES EXERCISES AND THEIR LIMITATIONS

Eyestrain may be caused by a refractive error, which can be corrected by spectacles and also by an imbalance of the eye muscles, and thus the question often arises as to how far orthoptic exercises can dispense with the necessity for glasses. Exercises cannot alter the refractive error, and short-sighted or astigmatic eyes will need correcting lenses to get full visual acuity. On the other hand, patients with a small degree of hypermetropia and astigmatism may wear spectacles to relieve a strain which is really muscular. Such patients may find, when the muscle balance is restored to normal, that they are quite comfortable without the spectacles, and they can then leave them off. Up to a point a patient with a high degree of hypermetropia may be taught to control an esophoria without glasses for a limited duration of time, long enough perhaps to appear on a stage or on a platform without spectacles which would interfere with this kind of work. It is interesting, although quite logical connexion between muscle balance and presbyopia is evident. A patient of forty-five years of age who is finding reading power without a presbyopic correction often shows a deficiency of convergent power. In increasing the convergent power, accommodation is automatically stimulated and the patient finds himself able to do close work without his reading glasses. This is convenient but the real benefit of this link applies to the large group of patients who have a small amount of exophoria. Up to the age of forty-five

they can control the tendency to diverge by the effort of accommodation with its accompanying convergence, but as soon as presbyopic glasses become necessary the stimulus to accommodate is lessened and the exophoria becomes manifest and tends to break down into an actual divergence. With exercises, reading glasses may not become essential until fifty years of age or later. In these cases exercises at home are kept up regularly and such a measure is only worth while when the alternative of spectacles will give rise to headaches and possibly double vision. A person with good muscular balance would probably find it easier to use readers and dispense with the exercises unless his work called for constant change of focus, when it might be worth the trouble to retain as full accommodation as possible for a few extra years. Presbyopia cannot be staved off indefinitely.

NON-COMITANT STRABISMUS

So far the squints discussed have been cases of concomitant strabismus in which no muscle is actually impaired, and these cases are by far the most numerous. The small group in which one or more muscles are impaired, either from peripheral or central damage, includes accident cases affecting the skull, local inflammatory conditions, such as sinus trouble, and general diseases which involve the eyes, such as the exophthalmic ophthalmoplegia in thyroid disease, or nervous lesions such as occur in encephalitis, disseminated sclerosis and others. Some attempt is often made to help patients by exercises. When the condition is due to a general disease little can be done, any improvement easily relapses, and although the patient often feels helped the measurements show that this is more psychological than actual. The traumatic cases on the other hand are well worth undertaking. It is rarely that a muscle is completely paralysed and with time and patience a considerable amount of power can slowly be recovered in the affected muscle, often enough to restrict the diplopia to a lateral segment instead of being present over the whole field of vision.

Double vision accompanying sinus disease can generally be eliminated by exercises once the primary trouble has been cleared. If these patients are not helped they may experience considerable difficulty in reading, as the two images are very close together, and yet the patient is unable to make the correct muscular effort to obtain a single image of the print. Daily exercises at home enable the patient to regain control in a month or so as a rule.

To summarize for this group, the paretic muscles due to a peripheral lesion are worth attempting, paralyses from a central lesion are not.

CONCLUSION

Orthoptic training has been developing slowly since about 1880. Javal in France designed diagrams for the stereoscope, many of which are still used. The stereoscope was used chiefly as an instrument for entertainment since the middle of the nineteenth century, and was widely popular until the cinema arrived. But in using it the eye muscles are automatically stimulated and controlled if the pictures are to be seen in perspective. From the stereoscope, instruments have been developed which can be adjusted to eyes which are not straight. These have become an important adjunct to spectacles, occlusion and surgery in modern orthoptic treatment, which aims at complete normalcy of appearance of the eyes as well as of vision, instead of an approximation to this, which was the most that could previously be attempted.

generally with organic changes in the islet tissue—tumour formation, either adenomatous or malignant. Recent work (Conn, 1940) has shown that a more common form is benign, a functional hyperinsulinism in which excessive insulin activity is compensatory to an excess of carbohydrate in the diet. The condition is not progressive and is responsive to appropriate modification of the diet. In the normal individual a high carbohydrate diet increases and a low carbohydrate diet depresses carbohydrate tolerance and insulinogenesis. In organic hyperinsulinism, insulin production is decontrolled and independent to a great extent of ordinary stimuli. In functional cases, stimuli and insulin responses are excessive and there is a hyper-reactivity, essentially an exaggeration of the normal. It may be that in these individuals the normal mechanism for countering the influence of insulin and preventing the blood sugar falling below a certain level is depressed by fatigue or other cause, but of this there is no certain knowledge.

On clinical grounds it may be difficult to distinguish the functional from the organic form, for in both hypoglycæmic attacks are liable to develop three to four hours after food but, in the benign type, they seldom occur during the night; the reactionary effect of the evening meal passes off sooner. In the organic form attacks at night and early morning are common times for attacks. In the functional form the history of a high carbohydrate antecedent diet is likely to be obtained and also that glucose relieves one attack but only to be followed soon afterwards by another. The shortness of the attacks and their tendency to clear spontaneously is also characteristic.

Some help in the differentiation can be obtained from the examination of the fasting blood sugar, for in the functional type the level is within normal limits or at any rate not unusually low, whereas in the organic form levels of 0.03 to 0.04 mgm per cent are to be expected. Probably the best method of distinguishing the two forms is by a provocative low carbohydrate diet which has a depressing effect on insulin reactivity in the functional form and, as a result of the low carbohydrate diet, the symptoms improve. In the organic form they are exaggerated.

Functional hyperinsulinism usually responds satisfactorily to an appropriate modification in diet—low carbohydrate and high protein. The latter is more slowly absorbed and the 50 per cent. conversion carbohydrate derived from it only reaches the blood stream relatively slowly. The average diet recommended by Conn contains from 120 to 140 gm of protein and from 50 to 75 gm of carbohydrate. This is given in three meals a day with, if necessary, additional protein at bedtime. Under such a regime, the symptoms of functional hyperinsulinism clear up in the course of a few weeks.

ANTI-THYROID SUBSTANCES AND THE TREATMENT OF HYPERTHYROIDISM

It is early days to discuss the treatment of hyperthyroidism with such substances as thiourea and thiouracil but there are already indications that a valuable therapy

autic measure has been discovered, although the merits, scope and limitations have yet to be defined. At the moment these substances are very much on trial; interim reports of cases successfully treated over a short time have already been published. Long-term results have not been observed and there is some question as to whether the short-term beneficial effects can be maintained.

Experimentally and clinically there is reason to suppose that the most likely action of these substances is to interfere with the synthesis of thyroxine. Their administration to animals results in all the signs of deficiency of thyroxine in the peripheral tissues, i.e., a lowered basal metabolic rate and hypothyroidism. Yet the thyroid gland itself becomes hyperplastic and the anterior pituitary too. The thyroid hyperplasia does not occur after hypophysectomy, so it is presumably secondary to the increased activity of the anterior pituitary, the latter presumably a compensatory reaction to the lack of thyroxine in the peripheral tissues and the interference with the synthesis of thyroid hormone in the gland. That the effect is not a peripheral one and due to a neutralization of circulating thyroxine is suggested by the coincident administration of thyroxine abolishing the systemic effect of these substances in hyperthyroidism.

Clinically the trials carried out so far with thiourea and thiouracil in hyperthyroidism have shown a striking similarity in results. The administration of 1 gm. of thiourea three times a day or 1.0 to 1.2 gm. of thiouracil daily in split doses brings relief of the symptoms of hyperthyroidism after a latent period of a week or two. For three weeks or so this dosage is continued and then subsequently reduced. Within three to seven weeks, in the majority of cases, the basal metabolism has fallen to normal and the clinical signs of hyperthyroidism have abated. The protein fraction of the blood iodine in those cases tested has also fallen from high levels to normal limits. After the initial stages in the cases so far treated, a maintenance dose of thiourea of 2 gm. daily has been adopted. At the moment opinions are conflicting as to whether control of the hyperthyroidism is maintained with continued maintenance treatment and whether the condition relapses or not if treatment is discontinued.

It will be interesting to get information about the thyroid gland in cases which came to operation after treatment with these substances, for the crux of the problem in hyperthyroidism is the overactivity of the secretory cells. It could even be expected that an interference with the synthesis of thyroxine and a shortage in the gland and body tissues might tend to induce further thyroid hyperplasia. True this might ultimately result in the gland units becoming exhausted but, judging by thyroid behaviour under other conditions, it might take a long time. Anti-thyroid treatment of this type might well have to be long term.

The question of dosage is obviously important and it may be possible to decrease circulating thyroxine to a normal level but not below, so that any internal stimulus to further thyroid hyperplasia would be avoided. Even then there is still the problem of the overdriven secretory cells and the stimulus which overdrives them.

Further reports of the treatment of hyperthyroidism with these substances must be awaited before their use is widely adopted.

SLOWLY-ACTING PITUITRIN PREPARATIONS IN THE TREATMENT OF DIABETES INSIPIDUS

The control of diabetes insipidus—the posterior pituitary deficiency hypothalamic syndrome—has been much improved by the discovery of slowly-acting pituitrin preparations. Several delayed action compounds have recently been tested out and one of the best, pitressin tannate in oil, has been suggested by Court and Taylor, 1943. This promises to be effective. It contains 5 international units pitressin per c cm, and the effect of a single intramuscular dose may last for two or three days.

As with other endocrine deficiency syndromes, it is important to decide whether the condition is functional or organic. In the latter case, diabetes insipidus may result either from rupture of the pituitary stalk with a fractured base, pituitary or suprasellar tumours, secondary deposits from carcinoma of the breast or elsewhere, tumours of the third ventricular region or encephalitis. The results of treatment and prognosis in these cases is evidently less satisfactory than in the functional form.

The crux of the problem in diabetes insipidus is the inability of the kidney to concentrate chloride in the absence of the posterior pituitary anti-diuretic hormone. Substitution therapy with pituitrin not only diminishes the polyuria but increases the concentration of chloride in the urine. Controlled observations in three stages—low salt, high salt and high salt diet with pituitrin regimes—will confirm the diagnosis.

In practice it appears that the best method of introducing *pituitrin tannate* treatment is in small and graduated doses at the start. With a preparation of this type in which the effect may last for two or three days, the position is somewhat similar to that with protamin zinc insulin. Unless small doses with adequate spacing are employed it will not be possible to estimate the overlap and cumulative effect.

Court and Taylor (1943) advocate for fourteen days a small daily dose of 0.2 c cm (1 pressor unit). If the condition is then satisfactorily controlled, 0.4 c cm every forty-eight hours for three weeks. If control is still adequate, the same dose at three-day intervals. If 0.4 c cm is insufficient, the dose should be progressively increased.

The chief complication which needs watching for is water retention and this may show itself by headache, drowsiness, oliguria and increase in weight.

This injection treatment of diabetes insipidus can be supplemented, if necessary, by pituitrin snuff (piton or di-sipidin). Frequent inhalation of small doses of these snuffs may be a useful adjuvant and enable the injection dose to be cut down.

The restriction of salt in the diet is a most valuable measure and the dosage of pitressin should be adjusted to the minimum salt intake consistent with ordinary requirements.

GONADOTROPHIC EXTRACTS IN THE TREATMENT OF DEFECTIVE GROWTH

Gonadotrophic extracts of the B type have proved most useful in the treatment of

cryptorchidism Results are due to stimulation of the testes with increase in their size and increased production of male hormone, the latter bringing about an increased development of the parts, relaxation of the tissues and facilitating the channels of descent Success depends on the capacity of the testes to react to stimulation, in their not being ectopic, i.e., off the normal track, and on the absence of any anatomical obstruction

Many boys with cryptorchidism are undeveloped and undersized for their age With gonadotrophic treatment a considerable acceleration of growth and development takes place This is similar to the acceleration of growth seen in the normal at puberty and is due to an increased production of male hormone which stimulates the growth cartilages to activity and maturity

Gonadotrophic treatment of this type is useful in stimulating growth in immature and undergrown boys—slow developers but otherwise normal—and this is usually a familial condition This treatment is also useful in boys with anterior lobe pituitary deficiency, in whom the defect of growth and development is usually pronounced As in cryptorchidism, results depend on the capacity of the testes to react to stimulation and on an increased production of male hormone They also depend on the capacity of the growth cartilages to react to stimulation and this again depends on the absence of damage or structural disease Gonadotrophic treatment does not appear to increase the stature of the individual above his normal expectation but rather to accelerate the delayed growth changes of puberty to a more normal age In many retarded boys this may be a distinct advantage In anterior pituitary deficiency, stimulation treatment is essential

If dosage is carefully controlled, there should be no danger of over-stimulation or premature fusion of the epiphyses and no ill-effects are likely to be observed from such treatment It is usual to give 500 units intramuscularly twice a week with one of the gonadotrophic preparations of the B type and for an initial course of, say, four to six weeks and then, after an interval, a second course of the same type if the clinical indications warrant it As regards dosage, however, every individual case should be treated on its merits and according to results

SYNTHETIC ŒSTROGENS IN THE TREATMENT OF CARCINOMA OF THE PROSTATE

Surprising claims have been made in the past few years for the use of œstrogens in carcinoma of the prostate and it is suggested that this treatment not only produces improvement in the patient's general condition but ameliorates bone pains, when secondaries are present, and in some instances results in recession of the primary prostatic growth It certainly appears to merit a full trial Stilbœstrol in daily doses of 0.5 to 1.0 mgm. has been the preparation used The treatment is based on the finding that patients with this condition benefited from bilateral orchidectomy but were made worse by the administration of androgens Then, biochemical investigations on acid phosphatase provided confirmatory support to the clinical view. It was shown that prostatic tissues have a high content of this substance and that in carcinoma of the prostate the serum acid phosphatase is

unusually high. Moreover, it rises higher as the patient's condition deteriorates, and after the administration of androgens. Oestrogens on the other hand produced a lowering of the serum acid phosphatase with coincident improvement in the clinical condition. The oestrogen treatment is employed therefore to neutralize the effect of androgens, the principal source of which is the male gonad.

ADRENAL HÆMORRHAGE AND ITS TREATMENT

An apology is perhaps needed for including a most unusual endocrine syndrome—adrenal hæmorrhage—but, if once encountered, it presents a clinical picture which is never likely to be forgotten and, unless the condition is recognized and adequate treatment to combat the adrenal insufficiency employed, a fatal result is almost invariable. There is no reason to believe that the hæmorrhage takes place simultaneously into both adrenals and, if the diagnosis of unilateral hæmorrhage could be made, appropriate treatment might be expected to save the patient. Such a case has in fact been reported.

The clinical features and sequence of events are characteristic—septicæmia with purpura fulminans and peripheral circulatory failure, lividity, coma and rapid sudden death (the Waterhouse-Friderichsen syndrome). It is due to the combination of a fulminating infection (usually meningococcal or streptococcal) with acute adrenal insufficiency, and in a previously healthy individual. Initial symptoms may be suggestive of food poisoning with pyrexia, vomiting and diarrhoea. Signs of peripheral circulatory failure with pallor, shivering, tachycardia and rapid shallow respiration quickly follow. A distinctive rash with petechial hæmorrhages appears over the whole body and this rapidly assumes a remarkable cyanotic hue. With the cyanosis, coma supervenes and, as collapse becomes more pronounced, an extreme picture is presented of lividity so intense and with diffuse purpura and ecchymosis so extensive that the appearance is suggestive of post-mortem staining and lividity. Respiratory embarrassment in the coma stage is most extreme and this is impressive in the absence of any gross physical signs in the cardiac or respiratory system. Post-mortem examination reveals the cause of death as bilateral hæmorrhage into the adrenal glands.

If there is any hope of these patients surviving, the importance of early and active treatment cannot be overestimated. The infective component should be combated with chemotherapy and the acute adrenal insufficiency with large doses of sodium chloride and cortical adrenal hormone.

References

- Conn, J. W. (1940) *J. Amer. Med. Ass.*, **115**, 1669.
Court, D., and Taylor, S., (1943) *Lancet*, **1**, 265.

THE EARLY MANAGEMENT OF PERIPHERAL NERVE INJURIES

By H J SEDDON, D.M., F.R.C.S

Nuffield Professor in Orthopædic Surgery, Oxford University, Clinical Director, Wingfield-Morris Orthopædic Hospital, Oxford

ALTHOUGH the surgical repair of peripheral nerve injuries is usually a late affair, primary suture is possible in some cases. Indeed, almost all surgeons would agree with Thorburn (1921) who wrote "primary suture of divided nerves is, as it always has been, the ideal method of treatment." But whether or not surgical repair is carried out early or late, and even in those cases in which operative treatment is never required, the final result may be marred if the early management is faulty. Therefore in every case this aspect of treatment must be considered.

DIAGNOSIS

It is often found that immediately after the infliction of an injury detailed examination is neither desirable nor even possible, but the mistake must not be made of forgetting that a nerve lesion may complicate almost any injury to a limb, and a rough examination should always be made. It is especially important to look for the less obvious lesions, such as paralysis of the posterior interosseous nerve or of the posterior tibial below the nerve supply to the calf muscle.

It is often difficult to assess *loss of muscle power*, as the patient, through pain or fear of it, may fail to move a part that is not in fact paralysed. However, when the nerve supply to muscles is normal a flicker of contraction is generally seen, however extensive the damage. Even when applicable, electrical testing is useless in the early days, as the reaction of degeneration does not appear before the fourteenth to eighteenth day. *Sensory testing* is always reliable, however, and when there is any insensibility a nerve lesion must be regarded as existing. It is usually sufficient to test sensibility by the drag-pin method, although if the patient's condition permits there is no objection to testing separately for touch and pain sensibility; and in most cases it will be found that the area of pain loss lies within the area of anaesthesia. The affected part will also show absence of sweating and may be warmer than normal, since the sudomotor and vasomotor fibres to the skin run with the cutaneous nerves and are paralysed with them.

Immediately after the infliction of a severe injury there may be a profound paralysis. It was noted by Weir Mitchell, Stopford and many others that this extensive paralysis frequently cleared up within a few days or weeks, leaving the patient either with a limb that was not paralysed at all or one in which paralysis was limited to one of the main nerves. This phenomenon is due to a non-degenerative type of lesion which has recently been called neurapraxia (Seddon, 1942), and it is the same type of lesion that is frequently seen as the result of

formed, but the treatment of the wound must be planned so as to permit complete closure without undue delay. The first requisite is the prevention of infection, and this is best attained by the earliest possible excision of all grossly contaminated and devitalized tissue, followed by immobilization of the affected part in plaster. The technique described by Trueta has done more than anything else to control infection following open injuries.

There is no objection to the application of sulphonamide drugs to a wound in which a nerve is damaged. Although nerves may be injured by large concentrations of these substances, especially if injected intramuscularly, the concentration consequent on a reasonably thorough dusting of the wound is not such as will cause appreciable damage (Medawar and Holmes, 1942).

If a *divided nerve* is seen during the course of the excision, the ends may be brought together by a single catgut suture passed through the extremity of each stump, if part of the nerve has been destroyed, the stumps may be anchored by single stitches to adjoining muscle or fascia. This will prevent retraction and as the part traversed by the suture will have to be sacrificed in any case in order to obtain good surfaces for secondary suture, nothing is lost and something is gained. If, on the other hand, the nerve is not seen, no attempt should be made to hunt for it, anatomical exploration is no part of the operation of excision. Should the paralysed nerve appear anatomically intact, the fact should be noted, as the chances are that the lesion is axonotmesis and therefore likely to exhibit spontaneous regeneration. In such a case it would be reasonable to wait for the time required for spontaneous regeneration to reveal itself before considering secondary exploration, instead of exploring at the earliest possible moment.

The measures that have been taken for the control of infection have also the merit of promoting union of any fracture that may be present, and this is of value, so far as the nerve is concerned, in that exploration is not likely to be delayed on account of non-union of bone. Those who, like myself, are convinced of the merits of excision and plaster fixation for the control of infection have, perhaps, paid too little attention to the time that is required for complete healing. The absence of serious infection and the rapidity of union of the fracture have been so gratifying that the presence of a granulating surface after such treatment has seemed a small disability. But the patient does not regard it in this light; nor does the surgeon who is called upon to repair a damaged nerve. He cannot carry out an exploration with safety within less than two months of the time of final healing. There is therefore every reason why the skin loss should be made good as soon as the wound has become a granulating surface, frequently this desirable state of affairs is present at the end of three to four weeks, and the application of a razor graft at this time may save the patient many months of invalidism. And it will enable a damaged nerve to be repaired without undue delay. It should not be forgotten that irreversible structural changes in the peripheral stump, and perhaps in end-organs, muscles, and skin, make the prospect of recovery after suture less favourable with every month that passes before the nerve is repaired. The history of the following case shows how quickly recovery may occur if the early treatment is well planned.

E.N., a soldier, was injured on 11.8.41, there was a deep laceration of the right elbow region, and complete radial palsy. Operation Royal Berkshire Hospital, Reading. Excision of all damaged tissue within six hours of the accident; dusting with sulph-anilamide powder; vaseline gauze dressing, enclosure in plaster of Paris

23.9.41 Referred to Wingfield-Morris Hospital, Oxford

28.9.41 Admitted. Clean granulating area on lateral side of elbow joint

1.10.41 Razor graft applied to raw area, after removal of granulation tissue. perfect take.

3.12.41 Exploration and suture of radial nerve

20.3.42 First sign of recovery

18.5.42 Recovery well advanced

Returned to work as a clerk in a joinery works, his pre-war occupation

Time interval between injury and return to work—nine months

WOUNDS IN WHICH PRIMARY SUTURE SEEMS LIKELY TO BE SUCCESSFUL—These wounds range from the small penetrating wounds of affare, which if treated early may sometimes be closed without risk of subsequent suppuration, to clean glass cuts which almost invariably heal well after suture. It is generally agreed that nerve suture should never be attempted if there is the slightest possibility of infection. A speculative operation, when the surgeon hopes to get away with it," always carries the risk of postponing recovery, for, if sepsis supervenes, it will be at least three months before re-suture can be carried out



FIG. 1

Early management of nerve injuries

Untouched photograph showing unsatisfactory state of median and ulnar nerves at wrist sixteen months after primary suture. There is a large neuroma on each. In the few cases in which there has been opportunity to re-examine nerves after secondary suture, there has not been any such eruption at the suture line.

THE EMERGENCY NARCOTIC TREATMENT OF THE MENTAL CASE

By J W FISHER, M R C S, D P H, D P M

Deputy Medical Superintendent, Devon Mental Hospital

THE restrictions of war time have enforced an economy of ideas with regard to the emergency sedative treatment of the excited and turbulent mental case. Thus it is that the older and simpler drugs, the "old faithfuls" of psychiatric medicine, are returning to favour. The "asylum hypnotics" of the alcohol-chloral and sulphonal groups (with the present exceptions of alcohol and most recently of sulphonal itself, for which methylsulphonal may be substituted) are all fairly easily obtainable, and for most emergency purposes would provide, together with morphine, hyoscine and bromide, a sufficient armamentarium for the general practitioner who, allured by the newer and more advertised drugs, has in the past rather tended to overlook their well-proven virtues. For this reason, it is proposed to make only the briefest reference to the more complex hypnotics, such as the barbiturates, which, although convenient and time-saving, are not generally speaking so cheap or safe as the more reliable drugs of the alcohol-chloral and sulphonal groups. Moreover, the barbiturates have already received adequate attention in previous issues of this journal.

THE ALCOHOL-CHLORAL GROUP

Alcohol is of special value as a mild hypnotic for the arteriosclerotic type of chronic dementia. Such cases are prone to emphysema and bronchitis, which paraldehyde, by its irritant effect on the bronchial mucous membrane, may aggravate. When obtainable, whisky, or preferably brandy, may be given diluted with warm water.

Paraldehyde ($C_6H_{12}O_3$), a mixture of the polymerides of acetaldehyde, is the institutional sheet-anchor for excited and troublesome cases, because it is the safest and cheapest and perhaps the most convenient of all forms of "chemical restraint." The present price of twelve 120 minim doses is approximately four pence. Its disadvantages are that it possesses a disagreeable taste, and that it may convey to some sensitive individuals an "odour of insanity." When insomnia is unaccompanied by mental symptoms, it is preferable to employ some other hypnotic, such as a barbiturate. Paraldehyde, after a transient initial stimulation, acts as a direct cerebral depressant. Being rapidly absorbed (solubility 1 in 9), it is quick acting, producing deep unconsciousness usually about fifteen minutes after swallowing. The depth is of short duration and is succeeded by several hours of quiet, dreamless and refreshing sleep without unpleasant consequences. It may safely be given to the aged, frail and debilitated and those suffering from heart disorder, as it is non-toxic and (unlike chloral) stimulating to the heart. With some patients it induces an intoxication similar to that provoked by alcohol, - small doses are more apt to be excitant than large ones. When this is the case, the drug is best avoided.

For alcoholic confusional psychoses, no less than for uncomplicated delirium tremens, paraldehyde is the hypnotic *par excellence*, serving the double purpose of narcosis and of substitution therapy. When practising the gradual withdrawal technique, the quantity of paraldehyde is slowly increased in step with the reduction of alcohol until the patient is taking paraldehyde alone, from which point the daily dose of paraldehyde is gradually reduced by suitable stages. Given in small doses of brandy, it is helpful in certain restless cases liable to collapse. Administered per rectum in 360 minim doses, repeated if necessary, it is useful for status epilepticus and for certain mental cases, when it is inadvisable or impossible to give it by mouth. As the drug is to some extent eliminated by the lungs, whereby the secretions of the bronchial tubes are stimulated, its oral administration is not recommended in cases of bronchitis and pneumonia. It is contraindicated in acute nephritis.

The usual dose is 60 to 120 minims, though up to 360 minims can safely be given in many cases as an emergency draught to get the patient under control. For acute excitement, it may be given in 120 to 180 minim doses twice or three times a day until the required effect is obtained. The unpleasant taste may be partly disguised by cinnamon water or extract of liquorice, with or without syrup, the whole dissolved in at least 2 fluid ounces of water to ensure solution. In one mental hospital the solution is prepared in this way—40 ounces of paraldehyde are emulsified with 64 grains of saponin (the active principle of quillaja bark) in 80 ounces of water. Dose 1 ounce. For rectal administration it is given in a dose of $1\frac{1}{2}$ ounces in olive oil or well shaken up in 4 ounces of warm saline. Dose up to $1\frac{1}{2}$ ounces.

Amylene hydrate (dose 30 to 60 minims) is fairly reliable, but it has now fallen into disuse on account of its expense and the fact that a state of excitement may precede the hypnotic action.

Chloral hydrate ($\text{CCl}_3\text{CH}(\text{OH})_2$), according to Grabfield, is "still the most useful of hypnotics and the cheapest." It acts directly on the brain, influencing excitability rather than conduction of nerve. Apart from a general dulling of consciousness there is no analgesia. As it evaporates slowly on exposure to air it cannot be kept in compressed tablets for fear of decomposition. It should not be prescribed with alkalis which decompose it to form chloroform. This effectual and cheap drug has unfortunately fallen out of favour owing to its reputed harmful effects, which in practice are actually non-existent provided that reasonable care is taken with the dosage. There is no substantial evidence that chloral has an action on the heart or vasomotor control (as reputed) or that it is much more dangerous than any of the other narcotic drugs in full doses (Alstead, 1936). When the blood pressure is recorded during chloral administration, the level is not appreciably lower than that which occurs naturally during sleep. A moderate dose, sufficient to produce deep sleep, is not large enough to cause gastro-intestinal irritation, cardiac or respiratory depression. Nevertheless, it is true that chloral, like many other hypnotics, may be dangerous in heart cases and seriously debilitated individuals if a state bordering on deep narcosis is produced. The drug is rapid in action, producing within thirty minutes to an hour a restful sleep, which may last from six to eight hours, and leaves no harmful or unpleasant after-effects.

and chewed, or swallowed with a draught of hot liquid. A useful mixture to combine the slower influence of sulphonal with the quicker effect of paraldehyde is the "A S P" mixture which consists of —

R Aspirin	5 grains
Sulphonal	5 grains
Paraldehyde	30 minims
Water	to ½ an ounce
Dose ½ an ounce t.d.s p.c.	

As sulphonal is now in short supply, methylsulphonal ($(\text{CH}_3)(\text{C}_2\text{H}_5)\text{C}(\text{SO}_2 \cdot \text{C}_2\text{H}_5)_2$ (trional) (dose 10 to 20 grains) may be substituted. It is rather stronger and more rapid in action than sulphonal. Administration must be conducted with the same care. It is best given in cachets, swallowed with a large draught of hot liquid. Sulphonal is preferable, however, when there is a choice.

Ethylsulphonal (tetronal), dose 10 to 20 grains, is more powerful and more easily absorbed than other sulphonals, but is little used.

MORPHINE AND HYOSCINE

A favourite method of quietening an excited or delirious patient is by an injection of hyoscine hydrobromide (1/100 grain) and morphine (½ grain) repeated in an hour if necessary. Hyoscine by itself, is not recommended, as it is apt to cause excitement, not only during the preliminary stage, but also when the immediate effect of the drug has worn off. To serve the purpose desired, morphine is perhaps best used alone, should it be really necessary, as for example in circumstances associated with pain. The opium group should not be used for hypnotic or sleep-producing results when pain is not a factor.

THE BARBITURATES

When a subcutaneous injection is indicated, as an alternative to morphine, hyoscine or both, there are a number of barbiturates, such as somnifane, sodium amytal from which to choose. Phenobarbitone or luminal is so slow in action as to be almost useless as an emergency hypnotic. Intravenous injections of a suitable barbiturate, such as sodium amytal, nembutal, evipan sodium, pernocton, pentothal sodium, have little place in the emergency treatment of the excited case, for the obvious reason that such an injection would be difficult or impossible without adequate assistance in the case of a struggling patient.

The *urea derivatives*, adalin, bromural and sedormid, and the *carbamates*, such as urethane and hedonal, are too mild in their action to be of much value for emergency use.

References

- Alstead, S (1936) *Lancet*, **1**, 938
 Browning, E (1940) "Modern Drugs in General Practice," London, 112
 Carver, A. E. (1933) *Brit J Inebri*, **31**, 73
 Grabfield, G. P. (1936) *J Amer med Ass*, **107**, 1381
 Gillespie, R. D. (1939) *J Neurol Psychiat*, **11**, 45
 Martindale (1938-1941) "The Extra Pharmacopœia," London
 Nosworthy, M. D. (1939) *St Thom Hosp Gaz*, **37**, 132
 Willcox, W. (1934) *Brit med J*, **1**, 415

THE INTERPRETATION OF PHYSICAL SIGNS

II—IN LUNG DISEASE

BY MAURICE DAVIDSON, D.M., F.R.C.P.

Physician, Hospital for Consumption and Diseases of the Chest, Brompton

IN the days before X-ray examination had reached its present high standard the physician was dependent for the diagnosis of intrathoracic disease upon methodical physical examination of the patient and correct interpretation of the signs thus elicited. When studying some of the older textbooks of diseases of the chest, written by clinicians of vast experience, the reader cannot fail to be impressed by the authors' skill in diagnosis and by the accuracy with which their systematic examination was conducted. Their success may perhaps be attributed to two main causes: first the greater amount of leisure and opportunity for careful and unhurried observation possible in those days, secondly, the attention almost invariably paid by them to the study of morbid anatomy, by which they were accustomed constantly to check their clinical findings. Although modern radiology has done much to revolutionize the study of chest disease, and indeed without the information supplied by first-class skiagrams the clinician would be working very much in the dark, the value of systematic clinical examination of the chest should never be underestimated. It must be remembered that patients do not come for medical advice labelled with the diseases from which they are suffering. The pathological processes that are at work are, except perhaps in a few cases, hidden from the eye of the examiner, whose diagnosis is reached by an application of inductive logic, a building up of evidence supplied from different sources, until a final picture is developed in which all the details are viewed in proper proportion. Undue dependence upon modern technical methods of investigation (chemical, electrical, and others), and a consequent neglect of the art of physical examination, have resulted in a certain lack of perspective, medical diagnosis has moreover suffered from the comparative neglect of the art of case taking, the value of time spent in eliciting a good history of the patient's illness being too often ignored, if not actually decried. It seems desirable to insist upon these points, since they really lie at the bottom of the difficulty often experienced in the diagnosis of chest disease, in which all available sources of evidence are significant. In the interpretation of physical signs, the importance of which is perhaps in need of some reinforcement to-day, the addition of details supplied by other methods of examination is essential to an adequate solution of the clinical problem.

The time-honoured sequence of *inspection, palpation, percussion, and auscultation* still forms a practical and necessary *modus operandi* in the physical examination of the chest and, although in modern chest work the observer has to rely upon radiological evidence to a degree undreamed of by his predecessors, the combination of systematic physical examination and intelligent investigation of the patient's medical history still gives him invaluable information for which that supplied by mechanical methods alone can never be an adequate substitute. As the

late Sir James Kingston Fowler (1921) once observed in his clinical aphorisms "Those who advise that all stethoscopes should be scrapped may be influenced by the fact that they do not know how to use their own"

It is in the light of the above principles that I wish to discuss the significance of essential physical signs in diseases of the chest, and their interpretation. I have used the expression essential physical signs in order once more to call attention to the tendency to lay too much emphasis on detail in physical examination and to neglect that synthesis of physical signs with clinical history and other sources of information upon which complete diagnosis really depends. Hardly any two instances of the same pathological process within the chest will give identical physical pictures. This is due to some extent to differences in the extent and in the exact situation of the lesion, and also partly to the considerable anatomical variation in normal individuals, a factor for which due allowance must always be made. I have always felt that a great deal of the difficulty experienced by many in the interpretation of physical signs would probably be lessened if more time were spent in systematic inspection, palpation, percussion and auscultation of the chests of admittedly healthy subjects of different builds and with varying degrees of muscular development. Only in this way is it possible to appreciate the normal limits of variation in the shape of the chest, the pitch of the percussion note, the intensity of vocal fremitus and resonance, and the auscultatory characters of the respiratory murmur. That practice on the normal chest should precede any instruction of the medical student in pathological physical signs I regard as a *sine qua non* of good medical education. As a postgraduate exercise I would commend it to any practitioner who may be prepared to devote even a little time to it, whenever opportunity offers.

SYSTEMATIC EXAMINATION

It is, I think, not only impracticable but unnecessary to dwell on all the points included in the textbooks on physical examination of the chest, many of these are found to be superfluous, and I wish to deal only with those which seem to me to be most helpful from a practical point of view.

INSPECTION—Inspection in chest cases, as in any other problem of medicine, should not be confined to the particular region of the body in question, but should include general bedside observation of the patient, in search of numerous other clinical phenomena, many of which may have a real bearing upon the disease present. As an example of this I may mention the problem of the patient with acute caseous (tuberculous) pneumonia, whose illness so often simulates in the early stages a frank lobar pneumonia, both in its onset and in the physical signs of massive lobar consolidation, the true nature of the infection being recognized only at a later period when delay in the expected resolution raises a doubt as to the correctness of the original diagnosis. Nearly always in these cases the respiration rate is considerably below that usually seen in a true acute (pneumococcal) pneumonia. This point should be noted in the preliminary inspection of the patient, since it may give a hint of the possibility of acute tuberculosis at an earlier phase of the disease.

The *short dry cough* associated with involvement of the pleura is another important detail during inspection. It is often most characteristic, and may be a valuable clue in the differential diagnosis between diaphragmatic pleurisy and other acute diseases simulating this condition.

The *presence of pulsation* in unusual positions, whether due to displacement of the heart's apex beat or to an aortic aneurysm or other intrathoracic tumour, is a point which, although mentioned frequently in books, is often ignored in practice. The common causes of cardiac displacement are (1) the presence in one pleural cavity of large amounts of air or fluid which displace the heart and mediastinum over to the opposite side, and (2) diminution in volume of one lung, either from collapse, or from shrinking due to fibrosis, the heart and mediastinum being then displaced to the affected side. Such phenomena as these may be recognized at the outset on inspection of the chest, confirmatory evidence being supplied by obvious immobility of the thorax on the side of the lesion.

The presence or absence of *cyanosis* gives an indication as to the degree of respiratory dysfunction and, in the absence of obvious heart disease, is suggestive of some gross lesion of the respiratory tract. It is likely to be more in evidence in *widespread involvement of both pulmonary fields* (e.g., in such diseases as diffuse bronchitis and broncho-pneumonia, generalized fibrosis, as seen in silicosis and other pneumoconioses, general dissemination of secondary new growth), than in unilateral lesions, however extensive, when the opposite lung is unaffected.

The presence of *large dilated veins* on the chest, indicating obstruction of the superior vena cava or its main branches, is often one of the first signs of the existence of large masses in the mediastinum due to neoplasm or to the enlarged lymph nodes of Hodgkin's disease.

Clubbing of the fingers is another important phenomenon in chest disease, and should be observed early in the systematic examination. It is, of course, not pathognomonic of any one condition, but often helps to narrow down the diagnosis. In pulmonary tuberculosis it is frequently seen, but is usually slight in degree, unless the disease is of long standing and accompanied by gross and extensive fibroid changes in the lungs. The early stages of clubbing show chiefly the slight curvature of the nails with congestion of the nail-bed and a slightly shiny appearance of the skin immediately adjoining it. Marked clubbing, the ends of the fingers being really bulbous, is suggestive of gross fibroid change in the lungs, and/or the presence of considerable or long-standing septic infection, as for instance, in cases of septic bronchiectasis, cystic disease of the lung, chronic lung abscess, or empyema in which drainage is absent or inadequate.

One feature which should not be overlooked is a *scoliosis*, not so much for its intrinsic significance as because of the extent to which even a moderate degree of lateral curvature of the vertebral column may affect other physical signs, especially the percussion note. A slight but definite dullness in one supraspinous fossa may be thought to be indicative of disease in the upper lobe of the lung when in reality it is due to the asymmetry of the chest. If the curvature is more marked, there may be appreciable atelectasis of one lung and, unless the skeletal deformity is observed, the clinician may be puzzled to account for the consequent alteration of percussion note and relative weakness of air entry on one side of the chest.

PALPATION

Apart from the confirmation of information already obtained by inspection, palpation is often important in eliciting localized pain, and this may give additional evidence in cases of localized pleurisy or of lung abscess. The nature of any abnormal swelling already noticed may be further elucidated, or some pulsation may be detected which had not been observed during inspection.

PERCUSSION AND AUSCULTATION

The character of the percussion note in different parts of the chest and that of the respiratory murmur, with the possible accompaniment of various adventitious sounds, are the physical signs on which, as a rule, reliance is chiefly placed in clinical diagnosis of disease of the lungs. Once more it is necessary to insist on the need for frequent examination of the normal chest, so that the examiner may better determine the variations that may be met with within normal limits. In a chest of average thickness and dimensions the note yielded on percussion has a certain quality which may be described as normal resonance and this can be recognized only by constant practice. It must be remembered that the force of the percussion and the thickness (from muscular development or from fat) of the underlying chest wall are two factors which necessarily modify to a large extent the note obtained, allowance must therefore be made for these, as well as for such normal phenomena as liver dullness, when interpreting the results of chest percussion. Similar factors must also be taken into account when estimating the intensity of the respiratory murmur. I mention these points especially because I have always felt that insufficient attention has been paid to them by teachers of clinical medicine, and from the observations of many of my own students I have gathered that they are often a genuine source of difficulty.

Another point of importance is that the examiner should endeavour to separate in his auditory mind the character of the respiratory murmur (vesicular or bronchial) from that of any added sounds that may accompany it. Failure to do so is a frequent source of much anxiety and uncertainty. Even when all the physical signs present in the chest are accurately recognized and described, it must still be remembered that they only give an indication of the general character of the alterations in anatomical structure of the underlying viscera, and that accurate diagnosis depends, as has been said before, on the correlation of this information with the patient's history, with data afforded by other ancillary methods of examination, and with the examiner's experience and knowledge of general and special pathology. It is almost impossible to give a really satisfactory account of physical diagnosis in chest disease except in rather general terms. I may, perhaps, be able to make things clearer by some concrete examples.

The physical signs of *lung consolidation* are dullness to percussion and alteration in the character of the breath sounds, the normal vesicular murmur being replaced by bronchial breathing. vocal resonance and tactile fremitus are increased, provided the bronchi are still patent. adventitious sounds may or may not be present according to the condition of the solid lung at the time of examination. In numerous clinical classes on physical signs in the chest I have not infrequently found that students find difficulty in interpretation owing to a failure to realize that the signs merely indicate the general alterations in the structure of the underlying organs.

and do not of themselves earmark the particular pathological process which has to such alterations. Thus, in any patient exhibiting the above signs of pulmonary consolidation, the fact of consolidation must first be noted and then the examiner must think of the different pathological conditions which give rise to it, diffuse or localized infiltration of the lung by inflammatory products (cellular fibrous or both), massive infiltration by new growth, or collapse of the lung tissue resulting from bronchial obstruction and absorption of the alveolar air. The decision as to which of these processes has been at work will rest partly on the combination of physical signs present and partly on the clinical history of the illness. I am conscious that the above method of teaching may appear somewhat lacking in precision, but I feel equally certain that many mistakes in diagnosis are due to the erroneous conception that even common diseases of the lungs have stereotyped physical signs, and that interpretation of the signs in any given case can be achieved in no other way than by some such process of induction as I have endeavoured to indicate. The classical signs of a large *pleural effusion*, viz. dullness and immobility of the affected side, absence of breath sounds, vocal resonance and fremitus, and displacement of the heart to the opposite side are obvious enough in many cases. Traditional teaching, however, has insisted on this physical picture to such an extent that it has come to be regarded as a *stricte qua non*, and there are many quite experienced practitioners who do not realize that the auscultation of obvious and clearly audible breath sounds all over one side of the chest does not necessarily exclude the presence of a considerable quantity of fluid in the pleural cavity; this phenomenon is especially liable to be met with in children.

In these circumstances, *ægophony* is frequently the sign which attracts the examiner's notice, and raises a suspicion as to the presence of fluid in a chest in which, contrary to expectation, the respiratory murmur is clearly audible. Failure to recognize this fact is sometimes responsible for persistence in the diagnosis of pneumonia and refusal to believe that fluid is present because of audible breath sounds. If any doubt exists in a case in which the unusual clinical course of the disease and an unexplained persistence of pyrexia should suggest the possibility of an empyema, it is surely safer to settle the difficulty by exploratory puncture over the dull area, especially if *ægophony*, of any degree, has been detected.

One other example may be given of a condition which may cause difficulty in differential diagnosis, viz. a *spontaneous pneumothorax* of sufficient extent to give rise to definite physical signs though not so large as to cause acute and obvious respiratory distress. In these circumstances the hyper-resonance on percussion of the affected side may be attributed to emphysema of the lung, especially if the difference in the note on the two sides is not extremely marked. Apart from the evidence afforded by X-ray examination, which may not always be immediately available, careful physical examination will usually reveal some displacement of the heart's apex beat to the opposite side, to an extent sufficient to suggest if not to demonstrate the real state of affairs. Mistakes of this character, though they should be avoidable by application of the systematic rule of physical examination, do occur in practice. More often than not the reason is the examiner's pre-occupation with the notion that he is dealing with a lung condition, which leads him to ignore examination of the heart in a case that is *prima facie* not cardiological.

By a similar distortion of reasoning the reverse mistake may occur. I have in mind an example of a case in which a cardiologist was called in consultation to see patient with extreme tachycardia, supposed to be due to hyperthyroidism, in whom he found a large pleural effusion secondary to an endothelioma of the pleura, the heart being intrinsically healthy.

ADVENTITIOUS SOUNDS

A few words may be said about the various adventitious sounds, which sometimes occasion difficulty, partly I think because of the unnecessarily complicated nomenclature by which they have often been described. The simplest and most satisfactory classification is that which divides them into dry and moist sounds. The former include rhonchi, which are heard in conditions in which there is narrowing of the air-passages (e.g., in bronchitis and in asthma), and pleural friction, audible on both inspiration and expiration, and often increased by increasing the pressure with which the chest-piece of the stethoscope is applied. The latter, known as râles, are due to the pressure in greater or less amount of moisture, and may be produced in the bronchi or in the alveoli. They may be fine (crepitations), medium or coarse, according to the site of production, i.e. alveoli, smaller bronchi, and large bronchi or pulmonary cavities in communication with bronchi.

Of the true significance of moist sounds, which may be heard in a vast number of quite different lung diseases, it is difficult to speak with precision, but in fact in regard to this aspect of physical signs that I have always felt that much of the regular teaching inclines to be over-dogmatic. In any pathological condition of the lungs in which owing to the reaction of the tissues to some irritant, mechanical, chemical, or bacterial, there is an abnormal quantity of moisture in some part of the respiratory tract, râles may be heard. As the histological condition of the lung parenchyma varies from time to time in the course of the disease, so corresponding variations are found in the adventitious sounds, the presence or absence of râles and their character depending on the state of the morbid process, its progression, retrogression, resolution and so forth.

It cannot therefore be said that moist sounds have anything more than a relative significance, or that they can in themselves be accepted as reliable data either for differential diagnosis or as a criterion of the activity of any specific inflammatory process. This is well illustrated in the case of *pulmonary tuberculosis*, in which especially the evidence of physical signs *per se* is now recognized to be extremely unreliable. In a diagnostic investigation, persistent râles in the region of either apex should always be regarded as highly suspect; their absence, however, and indeed the absence of all abnormal physical signs in the chest, does not exclude a diagnosis of pulmonary tuberculosis, many of the most active and potentially dangerous lesions being recognizable only by radiology. Moreover, the presence of crepitations is not, as is still sometimes erroneously taught, unequivocal evidence of activity in this disease, since they may persist in chronic arrested lesions which can be demonstrated by serial skiagrams to be completely static in a patient who has no evidence of toxæmia and who is leading a normal and even energetic life without detriment. In such a case the added sounds indicate no more than a slight non-specific catarrh in areas of the lung in which fibrotic changes have taken place in the parenchyma surrounding the smaller divisions of the bronchi. Sudden

gross variations in the extent or in the character of added sounds are much more likely to represent some significant and perhaps serious alteration in the pathological process responsible. The somewhat stereotyped textbook accounts of the physical signs in certain chronic diseases of the lungs, are apt to be extremely misleading, chiefly because they represent an average picture of the condition in question at a fairly advanced stage. It is therefore hardly to be wondered at that the practitioner who does not deal in the course of his work with large numbers of chest cases often experiences difficulty in recognizing such diseases at a really early stage, when physical signs are minimal or even absent.

The *early spreading granuloma* in the "young-adult" type of pulmonary tuberculosis, is perhaps the best example of this, especially as it may be not only unaccompanied by abnormal physical signs, but also symptomless. A similar difficulty occurs in cases of slight bronchiectasis, in which, though the symptomatology usually gives a clue, physical examination may reveal nothing unusual. In both these instances diagnosis is only possible by means of radiological evidence.

One other disease may be cited, viz. *primary bronchial carcinoma*. The physical picture here depends mainly upon the collapse of the lung which results eventually from broncho-stenosis. Blocking of the bronchus is, however, a gradual process, and the clinical picture will therefore vary considerably according to the stage of the disease and the degree of obstruction that has been produced. The lesser degrees of pulmonary collapse are often recognizable in an X-ray film long before the physical signs have made their appearance, a little later these may become apparent to some extent, although it may not be until much later that a massive collapse of the lung occurs with the classical picture of a large area of dullness, diminished or absent breath sounds, vocal resonance, and fremitus, and displacement of the heart to the affected side. Such massive collapse may occur with comparative suddenness, and the clinical picture may thus simulate that of some acute pulmonary disease. If, as not infrequently happens, there is a marked degree of fever, and if adventitious sounds are heard over the solid area of lung, either owing to the partial collapse if the bronchus is not completely blocked or because of superadded secondary infection, the picture of an acute pneumonitis is still more in evidence and the apparent sudden onset of the illness still more confusing.

CONCLUSION

I am conscious that the above notes are somewhat sketchy and that to those looking for clear guidance in difficult cases they may appear to be rather disconnected. As an apology for this I must plead that however careful and systematic the clinician may be, medical diagnosis can never be attained by rule of thumb, and successful achievement, though based on rational principles, will always remain something of an art which can only be acquired in the long run by constant practice and by the study of numerous cases, since hardly any two are exactly alike. I venture in conclusion once more to emphasize the importance of perspective in the examination of chest cases, and to insist that, however essential are the details given by the X-ray plant and the bronchoscope, the value of an accurate clinical history and the search for physical signs and their interpretation in terms of anatomy should not be underestimated.

Reference

Fowler, J. K. (1921) "Pulmonary Tuberculosis," London, 267

NOTES AND QUERIES

PURGATIVES IN ACUTE PYELITIS

QUESTION—I was very interested in Dr Peel's article on the treatment of acute pyelitis, but frankly a little worried about the rather drastic purgation which he recommends at the onset of the disease. I have always understood that drastic purgatives favoured absorption of organisms from the bowel. Indeed a genito-urinary specialist once either wrote or said that when a urine had been made sterile for operation on the urinary tract, there was no surer way of bringing infection back again than a dose of castor oil. It has been my practice only to use an enema in acute pyelitis and I should like Dr Peel's comments on this.

REPLY—In reply to the query regarding the use of a purgative at the onset of acute pyelitis, I do not know of any satisfactory evidence that purgatives lead to absorption of organisms from the bowel when used in ordinary therapeutic doses. On the contrary, in conditions such as bacillary dysentery, infantile diarrhoea, and food poisoning, in which the bowel contains virulent pathogenic organisms in large numbers, the prescription of an initial dose of castor oil is almost a routine, this procedure would be extremely dangerous if there were any risk of the organisms being absorbed. The circumstances in which a purgative is dangerous are those in which peristalsis might follow its use, e.g. in acute appendicitis, in typhoid fever, or in intestinal obstruction. The pre-operative use of purgatives in genito-urinary surgery is in a different category. Here the objection to drastic purgation would seem to me as a physician to be well-founded, and lies in the fact that the resulting dehydration increases the danger of shock. It is clear that in "making the urine sterile for operation" in a surgical case, the term "sterile" is only relative, the underlying cause of the infection, and the infective focus in the genito-urinary tract have not been eradicated until operation has been carried out; what has happened is that gross pus has been washed out of the urinary tract by means of a diuresis and that the urine is kept apparently sterile by the same means or by the use of antiseptics. In these circumstances dehydration by drastic purgation will lead to an oliguria and may well result in the transformation of a latent into a manifest infection.

ALBERT A FITZGERALD PEEL,
D.M., F.R.F.P.S.

SPINAL ANÆSTHESIA IN LEPROSY

QUESTION—Is leprosy, *qua* leprosy (not *qua* concomitant cachexia) a contraindication to spinal anaesthesia? i.e., what changes in the

spinal meninges or cord can obtain in leprosy?

REPLY—I can find no reference to spinal anaesthesia being contraindicated in leprosy. Leprosy is a disease of the peripheral nerves and, although the disease may extend as far as the anterior horns, there is no reason to believe that spinal anaesthesia would have a deleterious effect on the spinal cord or nerve roots.

R. R. MACINTOSH, D.M., F.R.C.S., D.A.

IMMUNIZATION

AGAINST WHOOPING-COUGH

QUESTION—Can the presence of an adequate quantity of "products," indicating the presence of specific immunity, be demonstrated a considerable time after active immunization against whooping-cough, when these "products" may reasonably be assumed to have been absent before the course of immunization?

REPLY—In the majority of children inoculated with whooping-cough vaccine, specific antibodies can be demonstrated in their serum many months afterwards. It is believed that the presence of such antibodies indicates immunity to infection, although complete proof of this has not been established.

DIETHYLSTILBÆSTROL IN
PROSTATIC CARCINOMA

QUESTION—I am much interested in a note which appears in *The Practitioner*, October 1943, page 252—"Prostatic Carcinoma Treated with Oestradiol and Diethylstilbæstrol", and should like to know whether the treatment described has been tried in cases of carcinoma of the stomach or intestinal tract and if so with what result.

REPLY—It is difficult to answer this question. The dramatic success of the treatment of carcinoma of the prostate with stilbæstrol and hexæstrol has led to considerable empirical experimentation on carcinoma in other sites. I myself have had a great many letters from people telling me that they have treated carcinoma of the breast with success. I find it very difficult indeed to come to any conclusion, since the observations have usually been made by practitioners, and the essential things, such as sections, and so on, are nearly always missing in cases in which good results have been reported. I think the only line to take is that at present there is no definite indication that stilbæstrol or hexæstrol are of any value in the treatment of carcinoma other than carcinoma of the prostate. Of this, however, there is no doubt at all, as I have myself seen many successfully treated cases.

L. C. DODDS, M.V.O., M.D., F.R.C.P.

PRACTICAL NOTES

CTOFOLLIN A NEW SYNTHETIC
GESTROGEN

CTOFOLLIN, a new synthetic oestrogen (4-diparahydroxyphenyl)-3-ethyl hexane) has been used in the treatment of vasomotor menstrual symptoms and those due to primary hypogonadism by H. K. Roberts, Ellen Loeffel and C. M. MacBryde (*Journal of the American Medical Association*, October 2, 1943, 123, 261). The series comprised forty-four cases, thirty of spontaneous menopause, eleven of artificial menopause after operation, and three primary hypogonadism. Continuous treatment for periods varying from one to nine months or longer was given in twenty-six cases, eighteen received interrupted therapy, i.e. 10 mgm daily for two weeks, then omission for two weeks followed by 2 mgm daily for two weeks. The next month the dosage was 5 mgm daily, then 10 mgm and 15 mgm. in the succeeding months. Seven of these patients received treatment for five months and eleven for seven months or longer. After an initial dosage of 0.5, 1.0 or 2.0 mgm daily by mouth for six to eight weeks, which dosage gave little therapeutic effect, the dosage in the continuous therapy group was gradually increased to 5 mgm more daily, severe cases receiving 10 to 15 mgm daily. Of this group of patients good relief of symptoms was obtained in 58 per cent., in 21 per cent., poor in 15 per cent. and in one case there was no relief. In the interrupted therapy group eleven of the eighteen patients showed good results; the dosage in these cases was higher, however, than in the continuous therapy group, i.e., average dose 10 to 15 mgm daily. The majority of patients required only 10 mgm daily for relief of symptoms. When receiving doses of 10 to 15 mgm daily the patients noticed tenderness of the breasts and increased pigmentation of the areolae, and in three cases vaginal bleeding occurred after interruption of treatment. Of the continuous therapy group receiving 5 to 10 mgm daily only 35 per cent. showed any change in the vaginal smears, whereas in the interrupted therapy group vaginal smears of each of the eighteen patients showed slight to moderate change in the cellular type. There was no incidence of nausea in either group, and no toxic effects were noted by liver function tests, blood studies or urine examination. This low incidence of side reactions is of considerable clinical value. The results of the observations indicated that diethylstilboestrol, when given by mouth, is at least five to ten times as potent per mgm. as octofollin.

LOCAL SALINE INJECTIONS IN THE
TREATMENT OF SCIATICA

CURE of sciatica after two to three injections of normal saline solution around the sciatic nerve is recorded by B. L. Chopra (*Indian Medical Gazette*, August 1943, 78, 393). The site of the sciatic notch is found by drawing a line from midway between the outer border of the ischial tuberosity and posterior superior angle of the greater trochanter to the upper angle of the popliteal fossa. The injection site is at the uppermost posterior point of the line. Using a lumbar puncture needle, which causes sharp pain along the whole course when the nerve is touched, four to eight ounces of normal saline solution at a temperature of 104° F are injected from a 30 c.cm. syringe. The injections should be given twice weekly.

THE TREATMENT OF SEVERE BURNS
WITH FATTY-BASE SULPHANILAMIDE
OINTMENT

AN ointment consisting of equal parts sterile lanolin and cold cream, to which was added by thorough dispersion sterile sulphanilamide powder to a 6 per cent. concentration by weight, has been used with success in the treatment of severe second and third degree burns by E. I. Evans and M. J. Hoover (*Surgery, Gynecology and Obstetrics*, October 1943, 77, 367). Briefly, the method of procedure is as follows—On admission the patient is immediately given an injection of morphine (½ grain for adults), or sodium luminal with morphine, but no other anaesthetic. Attendants and patient are immediately masked, the patient is placed on a stretcher and covered with sterile sheets and towels and, when free from pain, is removed to the operating room where the burned areas are cleansed by gently washing with liberal quantities of white soap and sterile saline. Débridement is carried out and a liberal supply of the ointment is applied to the burned areas. Almost immediately after application of the ointment the patient is relatively free from pain. This anaesthetic property of the ointment is one of its most valuable assets. Sterile surgical compresses are then placed over the ointment, followed by a pressure dressing. The patient is put in bed with sterile sheets, then splints, wooden or plaster, are applied. If the burns are infected when first seen this method is not used, instead, warm continuous saline compresses are placed on the burned areas and used until the wounds are surgically clean. If the infection is severe, sulphathiazole is given orally and sulphanilamide powder applied locally. Shock has

of course to be prevented or treated. The authors state that it is wasteful to attempt to restore the blood plasma volume fully before the fortieth to seventieth hour after the burn has been received. In the reported series, except in those cases in which shock was already present, plasma in amounts of 250 to 500 c cm was given in the first twenty-four to thirty-six hours, whatever the extent of the burn. Toxic reactions in the series were practically nil, there was no incidence of cyanosis, and a sulphanilamide rash which developed in three cases cleared up rapidly when sterile petroleum jelly was substituted for the ointment. Persistent local plasma loss occurred in one case only. Average superficial second degree burns were found to be healed when the initial dressing was removed on the seventh to ninth day; deep second degree burns required further dressing but healed by the fourteenth to eighteenth day. The healing of third degree burns depends largely on the time taken by the slough to separate and the formation of healthy, clean granulation tissue, this may occur after fourteen days but large areas may take from four to five weeks before skin-grafting can be carried out. One of the most encouraging features of the method was the good functional after-results in severe burns of the hands and arms, burns of the face also responded with excellent results. Stress is laid on two points—(1) The rate of absorption from the ointment is slow, whereas when a water-dispersible base is used the sulphonamide blood levels obtained are dangerously high, (2) the vital importance of masking, to prevent airborne infection, and the highest degree of asepsis.

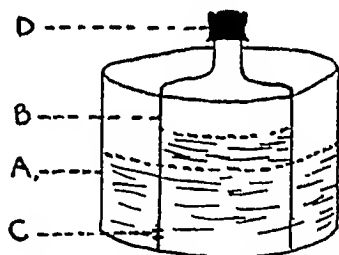
DERRIS ROOT POWDER IN THE TREATMENT OF SCABIES

A REPORT of effective cure within forty-eight hours in 94 per cent of cases of scabies treated with a derris root suspension (2 ounces of derris root to one quart of water containing 1 ounce of soap flakes, warmed to 100° F and freshly made daily) is given by Capt C V A Henriques (*Journal of the Royal Army Medical Corps*, October 1943, 81, 186). The patient is given a hot bath and is scrubbed with soap flakes and water. He is not dried. The derris root suspension is lightly scrubbed into the skin with a special soft brush, after which the patient is allowed to dry off in a comfortably warm room before putting on clothing. Disinfestation of underclothes, shirt, pyjamas and blankets was carried out, but the battle dress, greatcoat and bedding were left alone. The treatment is repeated five times during the day, at four-hourly intervals. In a total series of 250 cases so treated relapse occurred in only 6 per cent, and these subsequently cleared up after further

treatment. Mild chemical dermatitis occurred in four cases, all red-headed men, it is stated that red-haired individuals should not be given treatment with derris root.

METHOD FOR PREVENTING AIR-CONTAMINATED INJECTIONS

A SIMPLE method whereby the vacuum created in a vaccine or anæsthetic bottle is replaced by sterile air and thereby the risk of air-contamination avoided, is described by Capt. R. Bradbury (*British Dental Journal*, December 17, 1943, 75, 313). A round glass bottle with rubber cap stretched over the neck is placed in a saucepan or sterilizer after a small hole, about $\frac{1}{4}$ -inch in diameter, has been drilled through the side near the bottom. The bottle is boiled for one hour, during which time the air inside expands and bubbles through the small hole. After one hour's boiling the bottle is left in the boiler to cool and as the air in the bottle contracts water enters through the hole, filling about three quarters of the bottle, the upper part of the bottle now being filled with sterile air.



A, Boiler, B, air bottle, C, pressure hole, D, rubber cap

The syringe to be employed should if possible be boiled with the plunger at the full position, if not the plunger must be inserted under sterile water. After wiping the top of the sterile air bottle with a suitable antiseptic the syringe, full of water, is taken from the sterilizer and the needle inserted through the cap of the sterile air bottle. The plunger is pushed in and pulled out, thus emptying the syringe of water and filling it with sterile air. The needle is then withdrawn from the sterile air bottle and inserted through the cap of the anæsthetic or vaccine bottle, the cap having been previously sterilized. The sterile air is injected into the bottle and the solution withdrawn. It is stated that although no facilities have been available to test the sterility of the air in the bottle, as the air is saturated and kept at the temperature of the boiling water for one hour there can be little doubt on the point.

MORPHINE SOLUTIONS IN TIN CONTAINERS

THE packing of single doses of morphine solution in tin containers with needle attached for use in emergencies, a custom adopted by the U.S.A. medical authorities, has led to investigations to test any possible reaction between the morphine compound and the tin container. Christensen and Jurst (*J Amer Pharm Ass*, 1943, 32, 209) found no loss of potency when solutions of morphine sulphate were in contact with thoroughly cleaned tin surfaces, but there was a fairly rapid development of cloudiness due to reaction with the tin and the formation of a tin oxide or basic tin salt. The corrosion was retarded but not prevented when the morphine sulphate solution is buffered. On the strength of these findings a trial was made to see if the organic salts of morphine would give better results (*Pharmaceutical Journal*, October 16, 1943, 151, 146). Solutions of the acetate, citrate, lactate and tartrate were tested. Slight discoloration occurred with the first three substances, but solutions made with the tartrate, containing $\frac{1}{2}$ grain in 15 c.c.m. of 0.4 per cent. phenol solution, remained colourless and clear for one-and-a-half to two years. On the basis of this finding it is suggested that morphine tartrate should be used instead of the sulphate or hydrochloride for solutions to be packed in tin containers.

BACILLARY DYSENTERY CONTROLLED WITH SULPHONAMIDES

A REPORT of the successful control of an outbreak of Sonne dysentery by the administration of sulphonamides is given by H. M. Eisenoff and H. Goldstein (*Journal of the American Medical Association*, November 6, 1943, 123, 624). The outbreak occurred in an orphanage, and fifty children out of a total of one hundred and forty-five were involved. Bacteriological examination of stools showed positive culture in eighty-three cases. The outbreak started with the illness of a boy of eleven, who had persistent diarrhoea for three days. No cultures were made. The child became ill again about three weeks later, this time with fever, vomiting and diarrhoea. A stool specimen was positive for dysentery bacilli. Four other children had developed the same symptoms, and in nine days time all the children on the same floor of the orphanage were ill. The disease then spread and fifty children became ill. Cultures were made of stool specimens of all children in the orphanage, and also of adults employed in the institution. No positive cultures were obtained from the adult specimens, but eighty-three children were positive for *B. sonnei*. Sulphonamide therapy was instituted, four derivatives being employed: sulphathiazole, sulphadiazine, sulphaguanidine,

and succinylsulphathiazole. All children with positive stools were given the drugs for an average of four days. Total inhibition for a time of growth of all intestinal organisms resulted in 80 per cent. of children treated with sulphathiazole, in 70 per cent. of those treated with sulphadiazine, in 63 per cent. of those treated with succinylsulphathiazole, and in 36 per cent. of children receiving sulphaguanidine. There was no definite check up for the duration of total inhibition of intestinal bacteria, but in five children who had positive cultures on February 2, 1943, and to whom sulphathiazole was given from February 4 to 10, there was no growth in stool cultures on February 8, 11 and 15, but on February 24 the cultures gave growths of *Escherichia coli*. In another case in which a positive culture was obtained on February 4, the child was given succinylsulphathiazole from February 6 to 10, no growths were obtained on culture on February 11, but on February 15 there was growth of *E. coli*. Another child, positive on February 22, was given sulphaguanidine from February 24 to 27. Stool cultures on March 1 and 8 did not give any growth, but on March 10 there was growth of *E. coli*. Sulphadiazine was used in the case of a child with positive culture on February 5, the drug being given from February 7 to 10. No growth was obtained from stool cultures on February 11 and 15, but on February 24 *E. coli* was present on culture.

FORMALIN SOLUTION IN THE TREATMENT OF PLANTAR WARTS

A 3 per cent. aqueous solution of formalin has been used in the treatment of plantar warts in a series of thirty-six to forty cases by S. Thomson (*British Journal of Dermatology and Syphilis*, November 1943, 55, 267). The majority were children of school age but some older patients were included. Most of the warts were of the virus type, but there were six cases in which the condition was due to trauma. In eight cases X-rays or radium had been used without success. The method employed was as follows:—The patient was told to soak the affected area for ten minutes each night in solution placed in a doll's saucer or plate. The object of this was to ensure that the affected heel or anterior part of the foot should rest in the solution without the thinner skin on the top of the foot being wetted. No other lotions, ointments or plasters were employed. The pain in most cases disappeared after seven to ten days, and at the end of three weeks the warts had become white macerated plugs which could easily be scraped away with forceps. Some cases took seven to eight weeks before cure was obtained. Two patients only, girls in their late teens, failed to respond to the treatment. Only

plantar warts of the sole or palms should be subjected to the treatment as in other areas there is a definite risk of eczematization, this occurred in cases of warts on the face or on the back of the hands

THE INTRAVENOUS ADMINISTRATION OF LANTOSIDE C

LANTOSIDE C, a new glycoside of *Digitalis lanata*, has been shown by experimental and clinical trials to be the least toxic and the most potent of the *D. lanata* glycosides. Its use in the form of cedilanid (Sandoz), which contains 0.2 mgm of the drug in each cubic centimetre of the solution, is reported by J. H. Nicholson (*New England Journal of Medicine*, October 14, 1943, 229, 619). The drug was given in dosage of 8 c.c.m. of the solution, by the intravenous route, to a group of twenty-two selected cases consisting of six of rheumatic heart disease with mitral stenosis and regurgitation, two of hypertensive heart disease and fourteen of arteriosclerotic heart disease. All patients had auricular fibrillation, and only one had received digitalis in any form for at least one month before the institution of the treatment. The average age of the patients was fifty-four years, and all had original apical rates of at least 120 per minute, determined by stethoscope. Electrocardiograms were made in all cases in order to rule out coronary artery thrombosis. Irrespective of the original level the heart rate dropped to 85 or below in all cases within twelve hours of receiving lantoside C, the average period of fall being three hours and fifty-four seconds. In two cases there was a rapid drop, from 144 to 72 within fifteen minutes in one case, and in the other from 136 to 71 within thirty minutes. No untoward reactions were noted, except in the one patient who had been partially digitalized before the treatment, in this case there was nausea and mild vomiting for two days. It is stated that all the patients felt better within half an hour of receiving the drug. In patients who, owing to nausea and vomiting or unconsciousness, are unable to take digitalis by mouth, the intravenous administration of lantoside C (cedilanid) by the intravenous route, was found to have the required rapidity of action. It is stated to have a wide margin of safety and to require no fractional dosage.

PERSISTENT UPPER RESPIRATORY INFECTION

A NASAL spray of solution of sulphathiazole sodium 2.5 per cent. and desoxyephedrine hydrochloride 0.125 per cent. (sulmefrin Squibb) has been successfully employed in the

treatment of a case of persistent upper respiratory infection by H. W. Taylor (*Archives of Pediatrics*, October 1943, 60, 565). The patient, a boy aged ten, caught cold after bathing in March 1943. There was acute coryza followed by persistent running at the nose and slight cough for two months, when the child developed catarrhal croup. This cleared up in three days and the nasal drip and slight cough persisted for three months. Physical examination was negative, and examination of the chest and tonsils revealed nothing abnormal. All the usual nasal drops were tried without result. In August 1943 it was decided to try the sulphathiazole-desoxyephedrine nasal spray. This was carried out three times daily. After forty-eight hours there was marked relief, the stuffiness at and running at the nose had disappeared, and the cough ceased. The author states that the relief was so marked after the use of the spray that there could be no doubt but that it resulted from the medication.

CONTINUOUS INTRAVENOUS ADRENALINE IN SPINAL ANESTHESIA

UNDER this heading F. Evans (*Lancet*, January 1, 1944, I, 15) describes a method for the continuous intravenous administration of adrenaline in saline for the control of blood pressure during spinal anaesthesia. A cannula and stilette are introduced into a suitable vein in the forearm, the stilette is withdrawn and the cannula attached to a saline drip apparatus. The saline is dripped into the vein at 80 or 90 drops per minute for 20 seconds, so that the cannula may be cleared of blood, and then the drip is set at 50 per minute. A blood pressure cuff is applied to the patient's other arm, and a stethoscope strapped to the antecubital fossa. The blood pressure is taken and the patient turned on his side for the spinal puncture. As soon as the spinal anaesthetic has been introduced, and *before*, the patient is turned on to his back and the adrenaline added to the saline in the drip apparatus, the dosage recommended being adrenaline 1 in 250,000 normal saline. This can be obtained by adding 2 c.c.m. of 1 in 1,000 adrenaline to 500 c.c.m. of normal saline. The speed of the drip now varies with the individual patient and the height of the anaesthesia—the fastest required in the recorded series was 70 drops per minute and the slowest 20 drops per minute. The time for which the drip should be continued depends upon the time the spinal block lasts. The aim of the anaesthetist should be to keep the blood pressure at an adequate level. The approximate consumption per hour recommended is 250 c.c.m. of 1 in 250,000 solution.

REVIEWS OF BOOKS

Endocrine Disorders in Childhood and Adolescence By H S LE MARQUAND, M.D., M.R.C.P., and F. W. TOZER, M.D., M.R.C.P. London Hodder and Stoughton Ltd., 1943 Pp x and 298 Illustrations 49 Price 15s

THE authors point out that the rapid advance in the knowledge of the endocrines and their functions has given little time to arrange the essential facts to form a coherent whole. Thus, formerly the thyroid gland was given the first place in the description of endocrine function, but now the far-reaching researches of the last fifteen years have shown that the pituitary gland has even wider functions in regulating development and in exerting an influence on every other endocrine gland. This was one reason which led the authors ten years ago to search for endocrine disorders in every child who was sent to them, for whatever cause. Two other events occurred at that time which focused attention on this branch of medicine, one was the observation of an unusual case of *pubertas praecox*, the other the publication of Engelbach's *Endocrine Medicine*, a most stimulating work. The physiology of the endocrine glands is then sketched, leading off with that of the pituitary gland, the functions of which are so numerous and important. The pituitary disorders are classified and generously illustrated the conditions of progeria, Simmonds' disease, von Bergmann's pituitary emaciation and anorexia nervosa are grouped points of interest about the cases described by von Bergmann and those reported by Engelbach as non-adipose primary hypogonadism. Thyropituitarism, juvenile hyperthyroidism, toxic nodular goitre, adenal disorders, lipodystrophia progressiva and mental symptoms in endocrine disorders in childhood, are among the other subjects illustrated. The references are a most welcome feature of this up-to-date volume.

Hermaphroditos The Human Intersex By A. P. CAWADIAS, O.B.E., M.D., F.R.C.P. London William Heinemann (Medical Books) Ltd., 1943 Pp ix and 78 Illustrations 14. Price 15s

THIS is the considered substance of the author's Thomas Vicary Lecture on "Hermaphroditos The Human Intersex." Dr Cawadias adopts the biological approach to the study of intersexuality and rejects as erroneous the division into true and false forms. The human intersex has attracted much interest and a vast literature. The author has devoted much time to the

published work on this fascinating subject, and to the treatment, especially of the more frequent, the milder forms, which have become part of constitutional medicine. In spite of the large amount of work already carried out, the clinical and physiopathological views are so vague that definite lines of treatment are not available. Thus the term hermaphroditism should be abolished or, if kept at all, serve only as a poetical synonym of intersexuality, which is the true scientific medical term. The contemporary attitude towards intersexes reverts to the rational and humane conceptions of the ancient Greeks. Endocrine treatment is in the present state of science the most important method of treating extra-genital intersexes.

A Medical Bibliography A Check-list of Texts Illustrating the History of the Medical Sciences Originally compiled by the late FIELDING GARRISON, M.D., and now revised, with additions and annotations, by LESLIE T. MORTON, Librarian, St. Thomas's Medical School. London Grafton & Co., 1943 Pp viii and 412 Price 50s

THIS check-list of texts illustrating the history of medicine, was first undertaken at the suggestion of the late Sir William Osler (1849-1919) by the late Fielding Garrison (1870-1935), who utilized it in his wonderful *Introduction to the History of Medicine*, and also brought out a revised edition of his check-list in 1933 containing 4,186 items. The present edition contains more than 5,500 concise items, and is well indexed. In a pleasant, modestly worded introduction the editor expresses his gratitude to librarians such as Professor H. E. Sigerist of the Johns Hopkins University, Mr G. F. Home, librarian of the Royal Society of Medicine, and Mr W. J. Bishop its sub-librarian. The contents, as mentioned above, have been much expanded, a welcome addition is the space reserved for "conditions and syndromes not classified elsewhere." Each of the separate divisions is arranged chronologically, and thus the reader will find a most convenient arrangement and will expect all medical librarians to keep a copy of Morton's useful work.

Pasteurization By HARRY HILL, F.R.SAN I., A.M.I.S.E., F.S.I.A. London H. K. Lewis & Co Ltd., 1943 Pp viii and 152 Price 10s

THIS book may be taken as complementary to

NOTES AND PREPARATIONS

THE NUPERCALINE HANDBOOK

FORMERLY known as the "Percaine Handbook," the second edition of the "Nupercaline Handbook" (Ciba Handbook no 2) has just been issued in two parts. Part 1 deals with different aspects of spinal anaesthesia and Part 2 with local, surface, infiltration, regional and caudal anaesthesia. Technique, dosage, indications and contraindications and after-effects are included. Copies of the handbook are available to medical practitioners on application to Ciba Ltd, The Laboratories, Horsham, Sussex.

THE BRITISH ASSOCIATION OF OTOLARYNGOLOGISTS

THIS Association has recently been formed, with W M Mollison, C.B.E., M CH, F.R.C.S., as President, L Colledge, F.R.C.S., as Vice-President, V E Negus, M.S., F.R.C.S., as Hon Treasurer and F C ORMEROD, M.D., F.R.C.S., as Hon. Secretary. The address of the Association is 22 Upper Wimpole Street, London, W 1.

THE CHARTERED SOCIETY OF PHYSIOTHERAPY

THIS is the new name given to the Chartered Society of Massage and Medical Gymnastics, the new name being indicative of the wide scope of work undertaken by Members of the Society, such as remedial gymnastics, electrotherapy, and last but not least measures for rehabilitation of both civilian and Service patients. The address of the Society is Tavistock House (North), Tavistock Square, London, W C 1.

NATIONAL OPHTHALMIC TREATMENT BOARD

As from January 1, 1944, the fee charged by the National Eye Service for a medical eye examination to all insured persons will be 15s. The service is open to any patient whose family income does not exceed £250 per annum at the old fee of 10s 6d. The official address is 79 Sparkenhoe Street, Leicester.

PRINCESS TSAHAI MEMORIAL HOSPITAL FUND

As a lasting tribute to the gallant work of the Emperor Haile Selassie's daughter, Princess Tshai, whose untimely death at the early age of twenty-two was a great loss to her country, a Memorial Hospital is to be erected on the outskirts of Addis Ababa, near the curative hot springs. A partly constructed hospital situated on the site, with ample grounds and space for extension, has been made available by H I M the Emperor of Ethiopia, and it is hoped to

raise a total sum of £100,000 for building and extension of the work of the hospital. Inquiries should be addressed to the Hon. Secretary of the Fund, 3 Charteris Road, Woodford Green, Essex, and donations will be gratefully received by the Hon Treasurer, the Rt. Hon. Lord Horder, c/o Messrs H Reynolds & Co, 9 Greenhalgh Walk, London, N 2.

OFFICIAL PUBLICATIONS

Ventilation and Heating, Pamphlet no 1, issued by the Industrial Health Research Board of the Medical Research Council, and obtainable from H.M. Stationery Office, price 3d, deals with the vital subjects of correct and adequate ventilation both in the interests of health and output, and also with the subject of lighting. Lighting for the preservation of normal sight, for special types of work, the use of spectacles for defective work and for defective sight, and the effect of improved vision on the quality and quantity of work are among the topics discussed. The pamphlet is illustrated and is full of helpful suggestions.

Notification of Jaundice (circular 2883), issued by the Ministry of Health, deals with the subject of notification of catarrhal jaundice, acute inflammation of the liver, acute necrosis of the liver, acute yellow atrophy of the liver, toxic jaundice and infective jaundice, as under the Jaundice Regulations, 1943. These steps have been taken in view of the increasing prevalence of infective types of jaundice and the importance of correct estimation of the incidence for the success of the epidemiological and pathological study of the disease. The Regulations so far apply to the Eastern region only.

CONTENTS FOR MARCH, 1944

GYNÆCOLOGY

- Hormones used in Gynaecological Practice* By Professor E C Dodds, M.V.O., M.D., F.R.C.P.
Dyspareunia By R. W. Johnstone, C.B.E., M.D., F.R.C.S. ED., F.R.C.O.G.
The Investigation and Treatment of Sterility By Aleck Bourne, M.B., F.R.C.S., F.R.C.O.G.
The Diagnosis and Treatment of Carcinoma of the Cervix By Gladys Hill, M.D., F.R.C.S. F.R.C.O.G.
Ovarian Tumors By Stanley Way, M.R.C.S. M.R.C.O.G.

The Interpretation of Physical Signs III—In Diseases of the Nervous System. By C. M. Hinds-Howell, D.M., F.R.C.P.

THE HORMONES USED IN GYNÆCOLOGICAL PRACTICE

BY PROFESSOR E C DODDS, MVO, MD, FRCP

Courtauld Professor of Biochemistry, University of London, Director, Courtauld Institute of Biochemistry, Middlesex Hospital

AS this is intended as a review for those actively engaged in practical clinical work, the theoretical consideration of the subject will be reduced to a minimum and an attempt will be made to deal only with those aspects of the subject which are of practical interest. It follows therefore that the article must be confined to those hormone preparations which are available to the ordinary practitioner and which can be purchased in the ordinary way from the usual pharmaceutical sources of supply. No remarks will be made about preparations which are only available for research purposes. The list will include the following preparations —

FEMALE HORMONES — Estrogenic preparations such as —

*ESTRONE.

*ESTRADIOL BENZOATE.

*PROGESTERONE, AND ITS SYNTHETIC ANALOGUE OXYANHYDROPROGESTERONE (ETHISTERONE)

CHORIONIC GONADOTROPHIN AND PREGNANT MARES' SERUM GONADOTROPHIN

*SYNTHETIC ESTROGENIC SUBSTANCES — STILBÆSTROL, HEXÆSTROL, DIENÆSTROL

MALE HORMONES — TESTOSTERONE IN THE FORM OF *TESTOSTERONE PROPIONATE AND *METHYL TESTOSTERONE.

THE POSTERIOR PITUITARY PRINCIPLE, OXYTOCIN.

All the substances given above can be readily obtained under a number of trade names, but the commercial literature always gives the appropriate scientific designation. Perhaps one or two general remarks about the preparations will not be out of place here. The question is frequently asked which preparation of stilbæstrol is best, and if so-and-so's æstradiol benzoate is as good as someone else's. Such questions indicate a complete lack of understanding of the nature of these products. The preparations marked with an asterisk are pure chemical

substances, either obtained from natural sources, or by degradation synthesis, or by complete synthesis, and as chemical substances they are pure. Therefore there is no question of a preference for any one make. In the case of diethylstilbæstrol, for example, the substance's melting point and chemical constitution is accurately known, and it is either pure stilbæstrol or not, therefore the question does not arise of one preparation being better than another. Again, the question of relative potency cannot arise as, being pure chemical compounds, this cannot vary. It must be remembered that this also applies to substances such as œstradiol benzoate, and there is really no need any longer to refer to mouse units and rat units. The substance should be prescribed and thought of in milligrammes.

The preparations not marked with an asterisk are at the time of writing of unknown chemical constitution. Moreover, they have not been obtained in pure crystalline form and therefore cannot be characterized in the way already outlined above. Animal standardization has to be resorted to and in the case of pregnant mares' serum, urinary gonadotrophin and posterior pituitary, it is still necessary to use biological units. The greatest care is taken by the manufacturers to see that the products are so far as possible uniform. Whenever it is practicable, the international standard is employed in the same way as in the case of insulin. The question, however, as to whose posterior pituitary principle is the better cannot be answered with the same exactitude as when the query is made concerning the pure organic compound. If one of the reputable manufacturers is selected, there is of course no need for anxiety as to the quality of the preparation.

The fact that no list has been given of extracts of whole ovarian or pituitary glands to be administered by the oral route may occasion some surprise. It will be remembered that up to ten years ago there was a great advocacy in the use of dried ovaries and pituitaries. It cannot be too strongly pointed out that the advent of exact methods of studying clinical endocrinology and the improvement in methods of animal standardization have literally failed to reveal any potency whatsoever in preparations of this type and, despite a long and occasionally impressive series of papers on the treatment of, for example, the pituitary type of obesity with dried powdered anterior lobes, modern research can confidently dismiss these preparations as being both obsolete and useless.

CLINICAL EXPERIENCE

The literature on the use of hormones in gynæcology is extensive and is unfortunately mainly of overseas origin. It is depressing to realize that in this country where so much pioneer work has been done on the sex hormones by physiologists, zoologists and biochemists, the clinical appreciation of these discoveries has lagged so far behind. Whilst being fully cognizant of the splendid pioneer work done by the American and Continental workers, it should be remembered that the fundamentals of sex physiology were evolved from the pioneer work of F. H. A. Marshall at Cambridge during the past quarter century or so. With the advent of powerful and accurately defined preparations, the American and Continental gynæcologists were quick to see the revolution they would cause in their subject. On the Continent and in America, for example, the use of uterine

opsy in all cases of menstrual irregularity had become a routine procedure several years before the war. In this country it is unusual, to say the least of it, to find a gynæcological department at a general hospital where such a procedure is undertaken, even in the most rare and special cases. It is depressing to think that a case of amenorrhœa in a young girl, or menstrual irregularity of any kind in a young woman, is treated entirely on expectant lines. There is no doubt that a great deal of the disappointment of gynæcologists in hormone therapy is due to the fact that they are out of touch with the tremendous strides made in the subject of sex physiology. All too frequently cases of amenorrhœa are treated with œstradiol benzoate or with stilbœstrol, without any investigation being made of the state of the endometrium. The indiscriminate use of these compounds cannot be too severely condemned.

It is difficult to review the use of hormones in gynæcology without writing a long account of the clinical and pathological aspects of many gynæcological conditions—a task for which I am in no way suited. I propose therefore to review the uses of these hormones and to classify them as follows—

- (1) Conditions in which their employment has been proved to be fully successful
- (2) Conditions in which hormone treatment has appeared to give good results, but the results are not completely clear-cut.
- (3) Conditions in which, despite successful claims, results are either not confirmed or their use is contraindicated

(1a) *Restoration of menstruation in castrated women*—This observation first made by Kaufmann (1934) has been confirmed repeatedly, and there appears now to be no doubt that provided the correct dose of œstrogenic hormone and the properly timed injection of the progestational hormone be given, a true menstruation, judged not only by bleeding but also by uterine biopsy, can be obtained. That is to say, provided the uterine mucosa is normal, there appears to be no doubt that the menstrual cycle can be completely reproduced and imitated by hormone administration. Apart from its theoretical value, this form of treatment is of course of no practical use and is never employed. From this experiment, an implication has been drawn that menstruation can be produced in every woman. This of course is not true, since the cause of the amenorrhœa may not lie in a deficient ovarian secretion, but may be due to pathological changes in the endometrium which make it unresponsive to hormone therapy. As already pointed out, failure to produce menstruation or at least uterine bleeding in every case of amenorrhœa has led some clinicians to condemn the use of hormone therapy. A moment's consideration, however, will indicate how unfair such a criticism is, because it is known that all cases of amenorrhœa are not due entirely to insufficient ovarian secretion.

(1b) *Treatment of infantilism by œstrogenic substances*—This has been generally successful, provided the case is one of straightforward lack of development and not one of the Fröhlich type, in which only temporary changes can be induced.

(1c) *Suppression of lactation with synthetic and natural œstrogenic substances*—This again has been the subject of a series of papers reporting uniformly successful results. In the opinion of some clinicians, this is perhaps the most striking advance that has been made in clinical endocrinology, and this difficult and extremely painful problem is successfully solved for the first time. The mechanism is not a straightforward inhibition of lactation, and appears to be associated with a suppression of lymphatic engorgement.

(1d) *Treatment of the menopause with œstrogenic substances*—Here again, highly successful results have been reported with the use of naturally occurring hormone such as œstradiol benzoate and the three synthetic œstrogens, stilbœstrol, hexœstrol and dienœstrol. The complete abolition of the vasomotor symptoms and the restoration of normal mentality have been reported by all workers. Its toxic effect have been the subject of a number of papers. The toxic effects have only been reported with the orally active substances and particularly with the synthetic œstrogens. The reports of the most severe reactions have come from America. There appears to be little doubt that the early alarming American publications were the result either of over-caution or lack of experience. None of the later papers has confirmed the high percentage of side reactions, and the general consensus of opinion to-day appears to be that in some 10 per cent of patients some nausea and gastro-intestinal upset may be experienced, but if the dosage is reduced and the patient perseveres, the symptoms disappear and do not return. With regard to this nausea, it must be pointed out that this is of central origin and is not due to the direct irritating effects of the compounds on the intestinal tract, and neither elaborate coatings nor compoundings are likely to be of any value. The phenomenon is probably the same as the vomiting of early pregnancy when the body becomes saturated with œstrogens from the placenta.

A number of contributions to the literature claim that one or other of the synthetic œstrogens is less liable to give rise to toxic effects than another. The work, however, is by no means clear-cut, although there does appear to be a consensus of opinion that the likelihood of producing gastro-intestinal disturbance is greater with stilbœstrol, decreases with hexœstrol, and is probably at a minimum with dienœstrol. There is, however, not enough evidence yet to speak with absolute certainty.

(1e) *Kraurosis vulvæ*—The treatment of this condition with œstrogens, either œstradiol benzoate by injection or stilbœstrol, hexœstrol or dienœstrol by mouth produces the most remarkable results. A number of papers has been published reporting that the condition appears to be relieved and the skin returns to normal. The results can be accelerated by the use of either natural or synthetic œstrogens in the form of ointment. The beneficial effects of these compounds in skin diseases associated with the menopause have also been described.

(2a) *Habitual abortion*—The use of progesterone for the first three months in these cases has received considerable attention. The consensus of opinion appears to be that treatment if persisted in greatly enhances the chances of a continued pregnancy. A certain amount of criticism is, however, offered. In the first instance most of the series are small and, secondly, the treatment is combined with rest in bed and the usual sedative procedure. It is therefore difficult to be certain

that part the progesterone plays in relationship to the other standard methods of treatment. There would appear to be no doubt that the injection of progesterone for the first three months in such cases should be proceeded with.

(2b) *The treatment of menorrhagia* —The treatment of this condition with progesterone has become a standard practice. Unfortunately the material is scarce and expensive, hence there is not a spate of literature on this aspect of hormone therapy, as in the case of the cheap synthetic œstrogens.

In an attempt to make progesterone therapy more universally available, the synthetic sterol degradation product oxyanhydroprogesterone has been recommended. This also has the advantage of being active by mouth.

Alternatively, small doses of methyl testosterone are known to have a progestational activity, and the use of this compound has also been recommended. A word of warning must be given concerning the employment of this product. Large doses should not be given to women, and a careful watch for masculinizing effects should be maintained. Most disagreeable accompaniments have been described when large doses have been given over long periods.

That progesterone therapy will not succeed in every case of menorrhagia is obvious, since it can do good only when the condition is due to a deficiency of the progesterone phase of menstruation, and this can only be determined by uterine biopsy.

(2c) *Gonadotrophic principles* —There are available on the market three varieties of these substances —

(i) Chorionic gonadotrophin prepared from the urine of pregnancy. This is available in sterile solution for subcutaneous or intramuscular injection. Its action on the ovary is essentially luteinizing and it possesses little or no follicle-stimulating activity. It has been claimed that it may be used in the treatment of menorrhagia and in fact in any condition in which progesterone deficiency is indicated. A great many publications have appeared on this therapy, but it is not being too sceptical to say that the case is by no means proven, and the treatment should not be recommended.

(ii) Gonadotrophin from pregnant mares' serum. This again is a purified extract from the serum of pregnant mares, and is put up for clinical use in sterile aqueous solution for subcutaneous or intramuscular use. The widest claims have been made for the value of this preparation. The production of ovulation in anovular women has been described, and it is therefore advocated as a treatment for sterility due to anovulation, as a treatment for amenorrhœa due to lack of œstrogenic and progestational secretions from the ovary, and so on.

Here again, the interpretation of clinical reports presents great difficulties. That profound changes in the ovary of the animal can be produced is not denied. On the other hand, it is difficult if not impossible to prove their action in the human subject. With injection followed by laparotomy, changes in the human follicles have been observed, but of course whether this is *post-hoc* or *propter-hoc* is difficult to say. The diagnosis of lack of ovulation is difficult to make, and if the case does not respond to treatment the gynæcologist is unable to decide whether this is due to

failure of the preparation or to the fact that this particular ovary is incapable of response. It would appear that much more experimental work will have to be done before an answer can be given to these problems.

The third type of preparation consists of a mixture of gonadotrophins. One such contains pituitary gonadotrophin with chorionic gonadotrophin.

The theory underlying the use of this type of preparation is that gonadotrophin will supply the follicle-stimulating and -ripening action, ovulation will appear with the formation of the corpus hæmorrhagicum, and this will subsequently be luteinized by the added chorionic gonadotrophin.

Most promising claims have been made for the use of this type of preparation, it being claimed that ovulation has been produced in anovular women and that sterility has been cured. Their introduction, however, is too recent for the claim made to be accepted *in toto*, and more confirmatory evidence must be produced.

GENERAL CONCLUSIONS

The sex hormones present in many ways one of the brightest phases of experimental physiology, biochemistry and organic chemistry. From the therapeutic point of view, at first sight the results appear to be disappointing, but it is hoped that the arguments developed in this article will help to explain the reason for this. Owing to the extremely complicated nature of the sexual cycle in women their use as ordinary medicines given "three times a day after meals" is precluded except in simple replacement therapy of the menopause. For the irregular cycle or perhaps the cycle in which one phase is slightly deficient, the piling in of masses of oestrogenic or progestational substances can only complicate the issue and make the patient's condition worse. An accurate diagnosis of the patient's condition must be made and the appropriate hormone applied at the right time interval.

Finally, a word of warning must be given about the dangers of these substances. They are amongst the most powerful of biological and pharmaceutical agents available to-day. They can be bought by the general public without any restrictions whatsoever, and therefore it is essential that those prescribing them should explain to their patients that prescriptions should not be repeated nor treatment continued except under the supervision of a clinician. Irreparable harm may be done to the ovary by the indiscriminate administration of gonadotrophic substances, whilst the uncontrolled use of substances like testosterone propionate or methyl testosterone in women can produce complications little short of horrifying.

It is a pleasure to thank Dr. Peter Bishop for reading this article and for his suggestions on clinical matters.

Reference

Kaufmann, C (1934) *Proc roy Soc Med* 27, 849

STERILITY

By ALECK BOURNE, M.B., B.Ch., F.R.C.S., F.R.C.O.G.

Obstetric Surgeon, St Mary's Hospital, Consulting Surgeon, Queen Charlotte's Hospital and Samaritan Hospital for Women

THE conditions of war and the personal and social changes caused by war, together with the awakened public interest in the problem of depopulation in relation to the future changes in "population pressures," have all centred interest on the treatment of individual sterility. Not only the large number of women, compared with those of the pre-war years, who seek advice, but also the establishment of a Royal Commission to consider the trends of population in this country, are objective evidence of the private or personal and the public or national interest in sterility. Much more attention during recent years has been devoted to the prevalence and treatment of male sterility. A consultation on sterility some years ago was entirely concerned with the physical condition of the woman as she presented herself for interview and examination. Little thought was given to her partner, though now it is realized that something like one-third of all sterile couples fail to have children because of some defect in the husband. It is necessary to consider not only the wife or even the husband, but the two as a married couple. As a gynaecologist I am chiefly concerned with the female and in this article shall consider her in some detail, but it must not be forgotten that her husband must be examined with equal thoroughness by one familiar with the male reproductive system and appearances of the seminal fluid.

IMPORTANT POINTS IN HISTORY-TAKING

It is assumed that a woman calls for examination and advice because, although married some years, she has not yet had children. In addition to ordinary history-taking, questions are asked to find out the coital habits of the couple, evidence of underdevelopment of the pelvic organs, of possible pelvic post-inflammatory adhesions, of endocrine disturbance or other interference with ovulation.

(1) *The biological object of coitus* is to place an adequate number of normal spermatozoa in contact with the external os. A secondary result is to influence the secretion of cervical mucus whereby the ascent of the spermatozoa through the cervix and into the uterus and beyond, is made possible. Coitus may be imperfect by reason of pain or obstruction preventing penetration, but it often happens that neither husband nor wife know for certain if adequate penetration has occurred. Orificial pain may indicate spasm or hymen obstruction which are enough to make penetration impossible and conception unlikely though not impossible. Coitus may be too frequent, whereby the husband may be kept in a constant sub-fertile state by reason of too few or immature forms of spermatozoa, or it may be too seldom, so that a woman who ovulates only occasionally may never be impregnated at the time when the comparatively rare ovum is produced. Coitus may have been frustrated by contraceptive methods for many years. For example, a woman may have been married for seven years but have used control for the first six. The time of effective marriage is therefore only one year,

and on this she cannot truly complain of sterility. Excitement and the orgasm in the female are obviously not essential for conception, for many children are born of women who have never known the orgasm. Nevertheless, I believe that it is a useful biological event as it is always associated with at least adequate secretion of the essential chemiotactic mucus by the cervical glands. When there is no excitement or orgasm the cervix may be unresponsive and remain "dry." The canal in this condition cannot transmit the spermatozoa which need the chemiotaxis of the mucus by which to find and enter the os and a medium in which to ascend to the uterus.

I have noted during post-coital examination that when the woman has not felt the orgasm, an active secretion of mucus is still coming from the external os at least two hours after coitus. If the rate of descending tide of mucus is faster than the rate of travel of the spermatozoon it is obvious that it cannot reach the uterine cavity. On the other hand, when the orgasm has occurred, although the cervix contains mucus none can be seen escaping from the os, in other words there is a mucus medium within the canal but no descending tide.

(2) *Evidence of hypoplasia of the reproductive organs* is chiefly obtained from the patient's account of her menstruation. For example, late puberty, irregular and infrequent menstruation during adolescence, severe first-day dysmenorrhoea, scanty loss, short "periods," long and unequal cycles, all suggest a depression of pelvic function. To deduce from the incomplete menstrual function that the ovulation function is also below standard is perhaps an assumption, but clinical experience shows that a woman complaining as above will probably have a small uterus and find conception difficult or even impossible.

(3) *Pelvic adhesions* which seal, occlude or distort the tubes may be the result of salpingitis, suppurative appendicitis or any form of pelvic peritonitis. Evidence of these conditions in the patient's story may be direct or it may be inferred if she describes a labour or especially miscarriage which was followed by febrile illness.

(4) The most sharply-defined endocrine disturbance which commonly depresses fertility is *hypothyroidism*. The woman may be obviously too fat and complain of the other symptoms of hyperthyroid obesity. In addition, irregular, infrequent or scanty menstruation would strongly support the diagnosis.

PHYSICAL EXAMINATION

Physical investigation of a patient should be conducted in the form of a general routine and also in the light of any special information obtained from the interview.

(A) *Ordinary clinical examination* in the consulting room should note any significant departures from the normal, with special reference to signs of hypothyroidism, or virilism. Fibroids may be felt through the abdominal wall, but it is by the vagina that most information may be obtained. First, before passing the finger or any instrument or lubricant, a small piece of neutral wool should be passed by a sponge holder, withdrawn and tested for degree of acidity by the universal indicator. The colour (as shown on the bottle label) will give an approximate idea of the pH. If this is made about two weeks before the next period the vagina will be at the stage of maximum acidity. It should not be below pH 4, but occasionally, especially if the vagina be pale pink, thickly rugose and con-

ing a semi-solid "ground rice" material, the colour is a deep bright red, indicating an excessive acidity. This is important on account of the lethal action of a high acidity on the spermatozoon.

The state of the hymen as a possible organic obstruction and orificial muscular spasm as a cause of functional difficulty (vaginismus) must be carefully examined.

The vaginal mucosa is next inspected through a speculum. Reproductive activity, a vague but useful term—is related to the condition of the mucous membrane. If it is thick, pale and strongly rugose, the general inference is that œstrus at the middle of the month is active, from which, so far as is known at present, it may be assumed that ovulation is normal and regular. If, on the other hand, the mucosa is thin, smooth, more red than pink and only faintly rugose, then it is likely that œstrus, and its corresponding ovulation, is not regular or even present at all. The more the condition of the vagina approximates to that found after the menopause, the less likely is ovulation as a regular monthly event.

The speculum will also show the amount and nature of the vaginal fluid. It can be of the form of a normal, turbid, scanty mucoid material, chiefly in the vault, or profuse, clear or faintly turbid stringy mucus, or thick white fluid resembling pus, or a semi-solid "ground rice" material. The appearance of the cervix must be noted at the same time. An excess of mucus is often found with a bright-red non-infective erosion. Abnormal secretion to this degree is an obvious factor, making the ascent of spermatozoa difficult. Examination of pus will usually reveal *Neisseria gonorrhoea* as an infecting agent.

Whether or not the cervix points forwards—as in complete retroversion—or backwards, is probably of no importance, as in any case it is inevitable that the os will be bathed in the vaginal pool.

(B) Having inspected the vagina, the secretion and the cervix through a speculum, *bimanual examination* is made to find the degree of development of the uterus and the presence of any coarse lesion, such as a tubal swelling. A common experience is to find the uterus smaller than normal, but on passing the sound it is often surprising to note that the length of the cavity is greater than might be expected. The relative lengths of the corpus to the cervix, however, are not the normal 2 to 1. In the underdeveloped pubescent uterus the relation may be 1 to 1, or in the infantile type 1 to 2. Undersize of the uterus, although indicating a certain failure of the uterine growth impulse, is not incompatible with conception. It seems that women with a small degree of uterine hypoplasia may either be sterile or have to wait some years before they conceive, but it is common knowledge that occasionally a woman who has a really small uterus can become pregnant. The first conception may miscarry, but she has more chance of a normal pregnancy should conception occur a second time. Presumably, mere size of the uterus cannot affect the embedding of the ovum, for the ovum can embed itself in almost any pelvic tissue, and also pregnancy can occur after the operation of uteruloplasty, whereby the size of the uterine cavity is greatly reduced. It is probable that hypoplasia of the uterus, unimportant in itself, is an indication of defective ovulation.

(c) *Tubal patency*—At this stage of the investigation many gynecologists pass a hollow sound into the uterus, pressed well against the cervix, and insufflate the utero-tubal passage. It causes a certain amount of discomfort and sometimes

actual pain, but most patients tolerate it well. An assistant may listen over the hypogastrium for the sound of air or CO_2 escaping from the tubal ostia, and pain felt in the shoulder is clear evidence of bubbles of gas having escaped to beneath the diaphragm. A further modification of the insufflation technique is the use of a kymograph attached to the pressure system, whereby tracings are obtained which show various forms of wave. These are interpreted as types of tubal peristalsis which are claimed to be significant in assessing the prognosis. The apparatus at present is expensive and it is not yet proved how far the tubal condition can be interpreted from the details of the tracing. However, it enables a promising line of research to be made.

(D) A final detail is the removal of a fragment of endometrium by a "biopsy curette". This is a form of curet-

It can therefore be easily passed against the anterior or posterior out in the curette. Examinate pre-menstrual week. The object of the mucosa. The histological secretory phase is clearly apparent. An active corpus luteum. From the ovary has ovulated during follicle has ruptured but so far produces a fertilizable ovum. On the same woman have shown that. Sometimes the histology is the month's biopsy will show the young, ovulation takes place more becomes less frequent, so that or three times a year. In addition of ovulation, there is a variable irregular ovulation for some who show the "anovular" cycle of them ovulate very infrequently. An isolated endometrial biopsy that particular cycle a follicle accurate idea of the ovulation an endometrial scraping once useful field of investigation if of different ages, of varying degree of definite underdevelopment.

(E) *Salpingography*, after pressure, is chiefly indicated to confirm, or sometimes to show in addition will show the size and position of the tubes may even low action 1

— GUILBERT PITMAN, 34, Cornhill Road, Croydon, S.E. —

value

Please send me the books I have marked with a X for value

Name

Address

MODERN RETAILING, is not
BY MAX RITTENBERG. 100 pages

Just Published

MEMORY IN BUSINESS, is not
HOW TO REMEMBER FIGURES. 128 pages

Systematic Business 192 pages
The Over Index System 119 pages
Rittenberg's Salesmanship 128 pages
Letters that Bring Business 128 pages
The Art of Typewriting 192 pages
Business Matters for Women 112 pages
Rittenberg's Systematic Memory 96 pages
How to Do More Business 184 pages
Advertising that Tells 192 pages

How to Compose Business Letters 128 pages
What a Business Man Ought to Know 110 pages
O'Connor's Experiments Made Easy 198 pages
How to be Healthy in Business 128 pages
How to Write for the Press 150 pages
What Editors Want 128 pages
The Reporter's Guide 128 pages
Penmanship (6d net). 43 pages

1/ each (net), post free 1/2, or bound in strong cloth 1/6, post free 1/9
(Postage paid on two or more books)

(F) If the patient shows any suspicious endocrine failure, such as obesity, she should be investigated for evidence. This will be done by estimation of the basal metabolic rate, X-ray of the sella turcica and determination of sugar tolerance.

TREATMENT

Treatment of sterility is admittedly difficult and, on the whole, not highly successful. The present rate of failure indicates that little is known of the processes involved before and during fertilization and that there is little control of such defects as may be discovered.

Considering the female alone it may be necessary to treat (i) defective production of a normal ovum, (ii) obstruction to its entry into and passage down the tube into the uterus, (iii) failure to meet spermatozoa in sufficient number, and (iv) abnormality of the decidua.

The first form of treatment is that of the woman who, with her only detectable abnormality, is found, after detailed investigation, to have normal endocrine conditions, normal vaginal conditions, and active spermatozoa in the vagina. In such a woman one may have waited for five years without success, and finally she may be treated by all the different methods, and finally she may receive no further help. But it is not uncommon to hear of a woman who, after years of treatment, has conceived and is normally pregnant. In such cases there are many, show very forcibly that there are yet nothing is known. When a real cause for sterility is discovered, treatment is usually successful.

The second form of treatment according to what may be described as the examination already described.

The third form of treatment is that of *organic constriction of the vaginal orifice* formed by the folding of fibrous tissue around the posterior border of the hymeneal insertion are easily treated by suitable operations. Tightness of the hymen can be successfully treated by the use of vaginal glass dilators. Most operations on the hymen are the incision but also backward division of the posterior half an inch up the vagina, undercutting of the vaginal mucosa and suture of the vaginal mucosa to the perineal skin (perineotomy).

The fourth form of treatment is that of *spasm of the vaginal orifice* by muscular action (vaginismus) is impossible. Operations always fail. The psychotherapists claim to cure these patients, and this method should always be tried.

The fifth form of treatment is that of *infection*. Trichomonas are a serious bar to conception because of the damage they do to the spermatozoa.

The sixth form of treatment is that of *infection*. Trichomonas in the child-bearing age is usually due to trichomonas infection and is treated and cured, provided there is no other cause of sterility, and will probably happen quickly.

The seventh form of treatment is that of *abnormal acidity*. The first indication that the pH may be as low as 3.5 is the result of a high oestrogenic activity would be cured by

round
may be that the

progesterone (or a derivative) injected during the pre-menstrual week, but the dose, and therefore expense, would be very high, the result uncertain and probably maintained only so long as the injections were given. A simpler method of treatment is to ask the woman to give herself a douche of sodium bicarbonate, one teaspoonful to the pint, not more than two hours before coitus. The indication for this advice is finding the pH of the vaginal pool less than 6.0 and all the spermatozoa dead an hour after coitus. Despite a highly acid vagina it is possible for the spermatozoa to survive long enough in the vagina, provided the volume of alkaline seminal fluid is large and the cervix secretes alkaline mucus abundantly during the act.

(3) *Cervical infection* as demonstrated by pus in the canal (comparatively rare) is almost a certain impediment to the ascent of spermatozoa. It should be treated by thorough cautery of the entire length of the cervical canal. After about two months the whole canal has become newly covered by a columnar epithelium. Lacerations, even gross deformities of the external os, seem to have little or no influence on conception, and it is also doubtful if tightness and smallness of the internal os can have any effect on the ascent of spermatozoa. In the days when the only treatment of sterility was dilatation of the cervix, it was thought that coincidence alone could not account for the number of conceptions which followed this operation, but it is a purely empirical measure, the mode of action of which is difficult to explain. The important function of the cervix is its secretion of a thin, alkaline, chemiotactic mucus during coitus. If, for any reason, such as previous amputation of the cervix or lack of emotional interest in the act of coitus, there is either no mucus or too little, the effect may be to prevent conception, either by failing to assist in neutralizing the vaginal fluid or by failing to provide a chemiotactic attraction of the sperms into the external os and a medium within the canal through which they can travel.

The cervical secretion may be tough, viscid, almost gelatinous, as is normally seen during pregnancy or immediately before menstruation. This material is impermeable to the sperm. At the time of ovulation the mucus is most abundant, translucent, fluid and alkaline. This is the ideal medium for the ascent of spermatozoa, and it is rare to find the secretion at this time in the pre-menstrual gelatinous condition. The thin translucent condition of the ovulation period is a response to a high level of circulating oestrogen, and therefore the treatment of a thick gelatinous secretion is by stilbæstrol, one or more milligrammes a day, beginning about the last day of menstruation until the thirteenth day of the cycle. Failure to alter the condition of the cervical secretion is due to the dose of stilbæstrol being too small. In women over fifty-five, I have produced experimentally a typical abundant "ovulation" type of secretion by giving half a million units of oestrogen over a period of three weeks.

The cervical mucus has been described at some length because it plays a most important part in the function of conception. In the usual investigation of sterility not enough attention is given to this part of the mechanism, but the post-coital test is necessary to obtain all the information possible.

(4) A common finding is a *small uterus* or a corpus to cervix ratio of 1 to 1. As has already been said this condition is probably associated with defective ovulation. Genital hypoplasia is not incompatible with conception, but it is more

difficult, as shown by the number of cases of persistent sterility or the long periods of waiting before conception occurs. Despite certain statements by those with a non-scientific bias against contraception there is no real evidence that voluntary prevention of conception is a cause of failure of full genital development. There is some experimental evidence to show that absorption of some substance from the seminal fluid by the vaginal mucosa stimulates the premature development of the genital system of certain immature animals. This needs confirmation, but if further work supports the observation it is possible that a method may be found for treating genital hypoplasia by the vaginal injection or even intravenous injection of the active principle. Meanwhile the only method available is injection of the gonadotrophic hormones of the pituitary, or administration of stilbæstrol after the period and some form of corpus luteum preparation during the week before the period. This method is likely only to be of value in the very young. It seems that after the age of twenty-five or so there is no response to this form of therapy.

(5) It is claimed that *tubal occlusion* can be treated by repeated insufflation. Whether or not pressures up to 200 mm. are able to break down adhesions it seems certain that one or more insufflations of the tubes form a successful treatment. From a large number of cases Rubin has shown that pregnancy followed after five years of sterile marriage in 21.6 per cent. of cases of strictured or adherent tubes. Similar results are claimed as a result of injection of the uterus and tubes with lipiodol.

Operations on the tubes for occlusion nearly always fail, except when the mischief is no more than adhesion of the fimbriæ or occlusion of the fimbrial openings by filmy adhesions. When salpingography shows a normal tube except for fimbrial occlusion, the operation of salpingostomy is justifiable. Solomons reports 32 pregnancies following 72 operations for this form of obstruction, 16 patients becoming pregnant within one year of operation.

(6) *Defective or infrequent ovulation* is probably a cause of much sterility for which there is no other obvious reason. Prolan A (the follicle-stimulating hormone) can produce great follicular activity in small rodents, but on the whole it has failed to produce any results in clinical trials.

The hormone for clinical use is obtained from the serum of the pregnant mare at about the fourth month. It is probable that the dose used for clinical purposes is far too small to stimulate ripening of follicles.

"Subminimal" doses of X-rays to the ovaries have also been used as a stimulant. That they touch the ovary may be inferred from the frequent disturbance of menstrual function, and a number of pregnancies have been reported following this treatment. But it is possible that danger to the following generation may be a result of irradiating the ovaries. I have been informed by a biologist that the effect of this treatment on some animals is to produce fetal deformities in the first or even second generation. Until more is known of the biological effects of X-rays on the germ plasm it would be wise not to advise it as a clinical treatment.

(7) Lastly, there are the cases of *disturbed endocrine function* which show themselves chiefly by obesity and amenorrhœa. There are also other types associated with hirsutism and signs of virilism. Hypothyroid obesity is as a rule easily treated by thyroid extract and suitable diet. As soon as the weight declines substantially and menstruation becomes normal, conception is likely to follow.

the secretions of the Bartholinian and cervical glands is lacking and the labia, hymeneal membrane and vaginal walls are dry. In such circumstances the attempted coitus is inevitably painful, and is indeed only a few degrees removed from a legitimized rape. Fortunately such "ill-mating" may be avoided or rectified by ordinary consideration and gentleness on the husband's part, but, if it persists and the woman comes under medical care, the cause is usually found to be inflamed and exquisitely tender hymeneal tags (*carunculæ myrtiliformes*) or infected, tender hymeneal laceration resulting from the first crude attempts.

The presence of such tender spots at the introitus of the vagina is the most common cause of the protective contraction of the muscles known as physiologic vaginismus. The danger is that if conditions are allowed to continue unremedied the woman's fear of the pain may become deep-rooted and she may develop such a distaste for the very thought of coitus that even the successful treatment of the tender spots may not suffice to cure her of what has become the almost uncontrollable habit of contracting the muscles around the orifice. In other words the physiological vaginismus may become almost a psychopathic one, and such a case may require patience and simple psychological advice and treatment as well as physical treatment.

The diagnostic examination of these patients must be carried out with extreme gentleness. Sometimes the mere attempt to investigate the condition of the vulva sets up a muscular contraction, involving the adductors of the thighs as well as the vulvar muscles, which defeats the examiner. In such cases it is better to conduct the examination under a general anæsthetic and to be prepared to carry out any requisite treatment at the same time. The examination involves a careful visual inspection of the vulva and introitus vaginæ as well as digital palpation.

TREATMENT—In the milder cases all that is needed is, first, abstinence from coitus and the application of a simple antiseptic such as dettol ointment until all raw areas have completely healed.

Secondly, some simple advice to the husband on the necessity of gentleness and avoidance of haste in his approaches.

Thirdly, the provision of a lubricant, such as petroleum jelly (with or without 5 per cent cocaine, according to the degree of fear which the patient shows), to be used at the first few subsequent acts of coitus, until the patient gains confidence that the act is not necessarily painful.

In cases in which it is necessary or thought desirable to give an anæsthetic for the diagnostic examination the opportunity should be taken to stretch the vaginal orifice thoroughly. For this purpose the blade of a Sims' speculum with plenty of antiseptic lubricant (e.g. dettol cream) should be used and the perineum thoroughly "ironed out." Stretching has the advantage over incising that it saves the time spent in the healing of the wound. But if cutting is necessary—as, for example, in the case of an unduly tough and resistant hymen—it should be radical, the whole hymen being cut away at its base with scissors and the upper and lower margins of the linear raw area brought together with fine catgut stitches to promote healing.

by first intention. Ample time must be given for healing to become complete, and then begins the important effort to cure the tendency to vaginismus. This is effected by the use of graduated glass vaginal dilators with the phallic shape of test tube, the aim being to inspire the patient with confidence that an object as large as the erect penis can in fact be introduced into the vagina without pain. A graduated set of three or four dilators is required (fig 1)

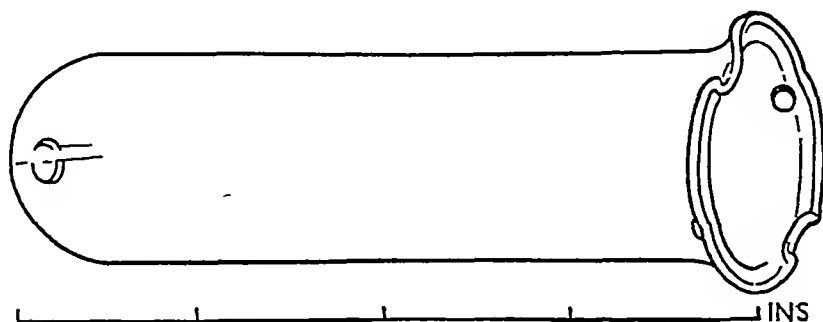


FIG 1
Vaginal dilator, 3rd size (drawn to scale)

The smallest size—about the thickness of the forefinger—is lubricated and gently introduced by an understanding nurse or the practitioner, and the patient remains in bed for a couple of hours twice a day with the dilator in position. When tolerance is achieved a larger size is used, and so on up the series. After the first day the patient should be instructed how to introduce the lubricated dilator herself. This is a point of great importance as the patient will more quickly gain confidence when she knows that she herself controls the instrument, and only confidence will allay the tendency to defensive spasm of the muscles. In some cases the first introduction of the dilators by the patient herself may be advantageously effected while she is in a state of muscular relaxation in a hot bath. Later applications should be more prolonged in duration.

This treatment must not be hurried, and in the meantime an opportunity should be made to have a talk with the husband and explain things to him. Indeed the education of the husband is only second in importance to that of the wife, and stupidity on the part of either may undo much of the good of careful treatment.

When the treatment is completed and marital relations are to be resumed, the patient should be advised to use a lubricant petroleum jelly on the first few occasions lest nervousness should inhibit the natural secretions, and to separate the labia with her fingers and guide the penis into the introitus, just as she has learned to do with the vaginal dilator.

Fear, or shrinking on the part of the woman, apart from the fear of pain following the early attempts at coitus already discussed, is usually associated with sexual frigidity. This is too wide a subject to be discussed in detail here. Suffice it that the hypogonadic type of woman often suffers from dyspareunia if she strays into the paths of matrimony, and her prospects of a happy sexual life are not improved by the tendency which, according to some psychopathologists, such

THE DIAGNOSIS AND TREATMENT OF CARCINOMA OF THE CERVIX

By GLADYS HILL, M.D., F.R.C.S., F.R.C.O.G.

*Obstetric Surgeon, Royal Free Hospital, Assistant Obstetric Surgeon, Elizabeth Garrett
Anderson Hospital*

CARCINOMA of the cervix is the most common form of malignant disease of the female reproductive tract and, as such, its importance can hardly be over emphasized. Moreover, in the early stages, when alone it can be treated with any degree of confidence, its symptoms are often slight and may even be overlooked altogether by the patient. For this reason, most careful attention must be paid to apparently trivial complaints, and indeed some authorities consider every parous woman should present herself regularly for examination at intervals of six months with a view to the early detection of the condition.

TYPE OF PATIENT

The patient is almost invariably a parous woman, or one who has had some trauma to the cervix. Carcinoma of the cervix is exceedingly rare in virgins, parturition, abortion, operation or even infection of the cervix generally precede the neoplasm. The age incidence is wide, ranging from the early twenties to the eighth decade of life, the majority of cases, however, occur in women between forty-five and fifty-five years.

TYPE OF GROWTH

Because to some extent symptoms vary with the type of growth, brief reference must be made to the main pathological varieties. These are —

(1) *Ectocervical* —The growth is squamous celled, and starts on the vaginal surface of the cervix, it may be either (a) a deep excavating ulcer or (b) a proliferative cauliflower growth, of these two the latter gives more noticeable symptoms at an early stage.

(2) *Endocervical* —The growth is an adenocarcinoma, originating in the columnar celled epithelium which lines the canal. This is the type which most signally fails to produce early symptoms, and which therefore may well only be detected in the initial stages should a vaginal examination be undertaken as a routine or in the course of some other investigation. The cervix is enlarged and hard, but unlike the hypertrophic condition which follows chronic cervicitis, the sequelae of parturition. Symptoms are negligible until the malignant process breaks through to the vaginal surface.

(3) *Polypoid* —A cervical polypus, apparently innocent, may prove on microscopic examination to be carcinomatous. When a patient presents symptoms attributable to a cervical polypus, it is wise to submit the polypus to the pathologist as a routine measure, and to be sure that in a parous woman removal of

polypus is carried out thoroughly, with excision of the base and curettage of the canal. These precautions are doubly important, since cases so discovered in a clinically innocent neoplasm offer the best chances of complete cure when treatment is properly instituted. Incidentally, when carcinoma of the cervix complicates pregnancy, it appears often to originate in a polypus.

SYMPTOMS

here is one outstanding symptom of this disease, and that is *irregular intermenstrual bleeding*. So important is this, that whenever such a complaint is made, full and careful investigation is imperative. If the patient is post-menopausal, such metrorrhagia will be more noticeable, but it must never be lightly dismissed. A differential diagnosis has to be made from other causes of irregular intermenstrual bleeding, such as erosion, innocent polypus, pedunculated submucous broid, placental polypus, incomplete abortion, the bleeding of the mid-menstrual period associated with ovulation, menopausal irregularities. But unless the diagnosis can be decisively established clinically, a pathological examination of the suspected lesion is essential. Characteristically, the irregular bleeding of cervical carcinoma is associated with minor trauma, such as examination, coitus, exertion, but this is not necessarily so.

Second in importance is the symptom of *offensive vaginal discharge*. Here again, there may be a number of causes, neglected pessaries or tampons, infection, deficient personal hygiene, but there is a certain characteristic odour in malignant cases which suggests carcinoma to the experienced observer. However, here again, unless some obvious cause for the offensive discharge is readily forthcoming, such as a forgotten foreign body in the vagina, a full examination with malignant disease in mind is essential. The discharge may be from secondary infection of the growth, but is, at times, due to a pyometra following partial obstruction of the cervical canal by the tumour with damming up of septic or necrotic material in the body of the uterus.

Finally, there is the symptom of *pain*. It is a tragedy that, speaking generally, pain is a late symptom in all varieties of malignant disease. Pain obtrudes itself persistently and obstinately on the notice of the patient, but in the case of the cervix, as in other forms, usually implies extension of the growth to adjacent structures. Involvement of the bladder, rectum and obturator nerves means extensive spread and a gloomy prognosis. Pain may be the first symptom, and is felt in the adjacent organs, the sacrum or down the inner side of the thighs.

Any one of these three outstanding symptoms may appear alone or, alternatively, their order may be reversed, but the sequence, bleeding, discharge, pain, is the common one, so the paramount importance of irregular vaginal bleeding cannot be too much stressed.

SIGNS

The signs of carcinoma of the cervix are elicited by careful vaginal examination, including the passage of a speculum. The late stages of the disease are comparatively easy; an excavating ulcer, hard yet friable, or a proliferating growth which

bleeds readily on touch, are unmistakable. The early stage is more difficult; a patch of velvety softness on a hard base, especially if the glove is blood stained, is suggestive, and unlike the generalized softness of an erosion. It may be added that touch is more sensitive than sight in distinguishing between an early carcinoma and an erosion. It cannot be too often stressed that when any doubt exists, a wedge should be examined microscopically. A polypus should similarly be submitted to the pathologist, together with curetted material from the cervical canal.

As has already been indicated, the endocervical growth may pass unidentified unless the possibility of an adenocarcinoma is borne in mind. At times, the examiner feels a firm ring which just admits the tip of the finger; this simulates a patulous os, but the free infravaginal cervix is not felt. This condition is brought about by the infiltration of the vaginal vault and upper walls by the growth, the lower margin of which is palpated. The cervix, largely destroyed by carcinoma, is enclosed by this cuff of indurated vagina.

Schiller's test in the diagnosis has with experience proved useless. The signs therefore depend on bimanual examination, inspection per speculum, biopsy and curettage, and vary with the type of growth, but any lesion of the cervix which bleeds readily on examination is suspect.

DIFFERENTIAL DIAGNOSIS

As indicated above, the differential diagnosis is from other conditions which cause irregular vaginal bleeding and discharge. Simple cervical polypus and erosion are the commonest and most important, ulcerated fibromyomas, whether cervical or submucous, the products of conception, or neglected foreign bodies irritating the vaginal wall, may produce similar symptoms. The infection of the cervix both acute and chronic can prove confusing, the former with an ectocervical, the latter with an endocervical carcinoma.

The blood-stained discharge of carcinoma of the fundus is less likely to obscure the issue, since the cervix is typically normal for the age of the patient.

The routine examination of the patient by the four methods indicated will determine the diagnosis, and the acid test of the microscope is indispensable when any doubt exists.

SPREAD OF THE DISEASE

Carcinoma of the cervix spreads primarily by direct infiltration of adjacent structures, the vaginal vault and walls, the bases of the broad ligaments, the bladder and rectum. The spread is also lymphatic. The gland at the bifurcation of the common iliac artery is usually first invaded, spread to more remote glands, inguinal, femoral, lumbar, follows later. Secondary deposits are comparatively uncommon, death precedes them or, if they are discovered, the condition is too far advanced for any but palliative treatment.

CAUSES OF DEATH

Untreated, the average duration of the disease is eighteen to twenty months; if the disease recurs after treatment this period is shorter.

Death may be due to several causes, but uræmia from involvement of the vessels where they cross the uterine arteries close to the supravaginal cervix is important, particularly so in the case of unsuccessful treatment.

Hæmorrhage, when the growth invades and opens the uterine arteries, is a second cause of death.

In some cases the patient succumbs to cachexia, anæmia and septic absorption, and in others to an ascending urinary infection, when the bladder is involved.

INTERNATIONAL CLASSIFICATION

Before discussing the treatment of carcinoma of the cervix, reference must be made to the international classification of the extent of the disease, since, naturally, treatment depends on the localization or spread of the growth, as well as on the general physical condition of the patient. Four stages are defined —

- (1) The growth is confined to the cervix and the uterus is freely moveable
- (2) The growth involves the vaginal fornices, but some mobility of the uterus remains
- (3) The growth has spread to the parametrium and/or the vagina, limiting movement of the uterus, and there are metastases in the pelvic glands
- (4) There is extensive spread to the parametrium and vagina, the bladder and rectum are involved.

TREATMENT

The two principal methods of treatment in carcinoma of the cervix are operation and irradiation. Both have advantages and disadvantages, but in the first place the decision must rest on the condition of the patient and the extent of the growth.

The operation is that described as Wertheim's hysterectomy, and implies the removal, by the abdominal route, of the entire uterus, the appendages on both sides, the broad ligaments, the parametrium, the glands in the broad ligaments and on the iliac artery and, most important of all, a cuff of vagina which gives a tough healthy vaginal wall completely to cover the neoplasm and fold over it.

Irradiation can be carried out by the use of repeated applications of radium at intervals by intracervical and vaginal applicators, using the Stockholm technique, or by continuous application of the radium into the canal and into the vagina, i.e., the Paris method. Whether surgery or irradiation be employed in the first instance, deep X-ray therapy will be used to finish the treatment.

In the late case, with extensive local spread, involvement of the bladder or rectum, or with distant metastases, neither can be used, and attention can only be focused on minimizing the discomfort of the patient.

Good nursing and scrupulous attention to personal hygiene alleviate the symptoms, and sedatives for the relief of pain should be employed freely. Aspirin, phenacetin, the barbiturates, opium and morphine can be administered as required, and analgesics must never be withheld. In some cases, particularly when symptoms are due to recurrence, incontinence from a vesical or ureteric fistula is the greatest source of distress. In a few instances it is justifiable to consider transplantation of the ureters into the colon should the general condition permit, and the patient be prepared to submit to operation as a palliative measure.

Recent research has been directed towards the cancer-retarding qualities of sex-stimulating hormones of the opposite sex (Emge, 1942). These substances may prove to have an important part to play in the treatment of carcinoma, but much more work will have to be undertaken before an authoritative pronouncement can be made as to their use. There is some evidence that oestrogenic substances accelerate the growth of cancer in the genital tract in women. It may be possible to use male sex hormones to retard growth in the female.

RADIUM OR OPERATION

There is general agreement that operation can only be considered in those cases in which the malignant process remains limited to the cervix and the uterus is freely moveable, that is, cases which fall into stage 1 of the international classification. Cases in stage 2 might be so considered in the hands of the most proficient operators but, for practical purposes, patients who when first seen are found to be in stages 2, 3 or 4 are not suitable for surgical measures.

It has been stated that it is possible to operate on 60 per cent of women when first diagnosed, that approximately 40 per cent of those so treated are free of the disease five years later, and that 10 per cent of recurrences show themselves between the fifth and tenth year after operation. These figures are similar to those obtained in patients, also in this stage, who are treated from the first by radium.

For the more advanced cases, stages 2, 3 and 4, radium should be used unless there is some contraindication.

This is not the place to go into the details of the technique of either operation or application of radium, but it is of first importance that whichever method is adopted it should be in the hands of surgeons experienced in the method of choice. If good results are to be obtained the cooperation of the fully trained team—surgeon, physicist, pathologist, nurse—is essential.

The tendency on the part of the lay public to regard the application of radium as the lesser procedure must be sternly checked, that way disaster lies—the disaster of inadequate treatment, of accidents in the application and of its use in unsuitable cases. Radium has, however, this advantage, that it can be considered for patients in whom growth is too extensive for adequate extirpation by surgical measures, and in women whose general physical condition precludes a major operation.

THE EARLY CASE—In the patient who presents herself and is diagnosed with the carcinoma still localized to the cervix and the uterus freely mobile, a decision has to be taken as to the best form of treatment, operation or irradiation for that individual. It is assumed for purposes of discussion that both forms of treatment are available and in equally skilled hands, when it is not so, the decision is of course largely made by circumstances. Each form of treatment has its protagonists—

In favour of surgery, it can be said that—

- (1) The neoplasm, in the suitable case, is completely removed with a margin of healthy tissue.
- (2) During the operation the glands on the iliac artery and in the broad ligament are removed.

(3) That the end-results are at least as good as those obtained by irradiation.
Against operative measure, it is argued —

- (1) That the immediate mortality of the procedure is much higher than with irradiation, with radium the immediate mortality is under 1 per cent. With surgery the figures vary considerably but an immediate mortality of 5 per cent is probably a low figure
 - (2) That operation involves more discomfort to the patient and a long period of inactivity
 - (3) That in only a very few hands can the end-results, if the immediate mortality is taken into account, be comparable to those of radium
 - (4) That in many patients the general condition precludes operation
- The arguments in favour of the use of radium are, obviously, the converse of those given above

In favour of radium it is said —

- (1) Provided the growth is localized the whole of the malignant tissue is fully irradiated
- (2) The immediate mortality is low, under 1 per cent, and the end-results are as good, if not better, than those obtained by surgery.
- (3) That the discomfort and disability of the patient at the time are less
- (4) That it can be used in patients whose general condition makes them unsuitable for operation

Against irradiation it is argued —

- (1) That as the intensity of the emanation varies inversely as the square of the distance, the effective rays do not reach the glands of the pelvis. The obvious reply is that when those glands are already involved the case is no longer an early one and should not have been classified as stage 1.
- (2) That radium is contraindicated by certain well-defined conditions which are sometimes present even in an early case, such as a low hæmoglobin, a white blood cell count under 6,000, by the presence of an irritative cystitis or proctitis, by personal idiosyncrasy

On balance it would seem that even in the early localized type the patient should be advised to accept treatment by radium, since the end-results are at least as good as those obtained by surgery, and the immediate mortality is substantially lower

CASES IN STAGES 2 AND 3—Here radium is the treatment of election, it offers a better chance of cure to the patient once the growth has spread so that complete surgical extirpation is a matter of doubt or impossibility. Radium would be contraindicated by certain conditions, the chief of which are —

- (1) *Anæmia* The patient should have a hæmoglobin of at least 60 per cent. before the application is made
- (2) *Leucopenia* The white blood cell count must be within normal limits, as irradiation induces a leucopenia
- (3) *Acute cystitis or proctitis* Both of these would be aggravated by the presence of radium in the vagina.
- (4) *Pelvic sepsis*, other than the surface infection of the growth
- (5) *Fistula*, communicating either with the bladder or the rectum
- (6) *Distant metastases*
- (7) *Personal idiosyncrasy*

Some of these contraindications can be removed. Transfusion will improve the blood picture and facilitate the treatment. Infections of the bladder and rectum, provided they are not due to the malignant process, will respond to local measures.

Pelvic sepsis must be cleared before the radium is inserted, with the single exception of pyometra. Here dilatation of the cervix with release of the pus and washing out of the uterus can immediately precede the application.

COMPLICATIONS OF TREATMENT

As in any grave condition, certain risks of treatment have to be accepted. Operative complications are well recognized, though fortunately of relatively rare occurrence; hæmorrhage, obstruction, peritonitis, or injury to ureters are obvious examples.

The risks of radium treatment are perhaps less well recognized, and here too complications are infrequent in experienced hands. Hæmorrhage is rare, but anæmia from the effect of the rays on the blood is not uncommon; burns may damage the vaginal walls and even cause fistulæ. As a later complication, an irritating watery vaginal discharge may be distressing to the patient, although not necessarily of grave significance.

SUMMARY

Carcinoma of the cervix is most common in parous women of the age period forty-five to fifty-five.

The three outstanding symptoms are irregular vaginal bleeding, offensive discharge, and pain in the sacral region and down the inner sides of the thighs.

The diagnosis is made by careful vaginal examination, bimanually and per speculum, supplemented by biopsy and a pathological opinion when any doubt exists.

Routine pelvic examination in parous women is increasingly advocated.

Treatment depends on the stage of the disease.

For stages 2, 3 and 4 radium is used unless contraindicated.

For stage 1 the choice lies between radical operation and irradiation, and on the whole the use of radium should be preferred.

Only in cases diagnosed and treated early is the prognosis hopeful.

In conclusion, quotation is made from the report of the Cancer Research Committee of the Medical Women's Federation, published in 1926, but still as regrettably true to-day —

"The great obstacle to success in the treatment of cancer of the uterus by any means is lateness in diagnosis. The majority of patients suffering from cancer of the cervix are not referred for radium therapy until the disease is far advanced. The average duration of symptoms in our cases was ten months. The majority of these patients did not consult a physician until the disease was far advanced, but in more than 25 per cent the average time elapsing before an examination was made was seven months. It cannot be too often emphasized that intermenstrual bleeding, or abnormal vaginal discharge, noticed near the age of the menopause, bleeding of any character or vaginal discharge after the menopause practically always indicate pelvic cancer. About one quarter of the patients complained of pain as an early symptom."

Reference

Emge, L. A. (1942) *West J Surg*, 50, 32

OVARIAN TUMOURS

By STANLEY WAY, M.R.C.S., M.R.C.O.G.

Tutor in Obstetrics and Gynaecology, University of Durham

It is not possible in the short space of this article to deal in an exhaustive manner with this long, complex and important subject. It is therefore necessary to confine it only to the important aspects of the commoner ovarian tumours, mentioning the rarer tumours and such things as operative technique only when these are of special importance. Naturally the emphasis will be on the clinical and practical aspects rather than on the pathological and theoretical.

GENERAL CONSIDERATIONS

Before considering any special tumours it is necessary to have clearly in mind a conception of the subject as a whole. Ovarian tumours are by no means rare, thus in the last five years at Newcastle 2 per cent of patients admitted to the gynaecological ward were suffering from ovarian tumours. In all, some 450 cases have been seen. Ovarian tumours are no respecter of age. I have seen one in a child of four-and-a-half months, and one in a woman of ninety, but for the most part they are rare before the age of twenty and after seventy, the greatest number in the Newcastle series in one decade being between the ages of forty-one and fifty. Actually 75 per cent occur between the ages of twenty-one and sixty.

At least a quarter of all ovarian tumours are malignant. If the fact is borne in mind that the prognosis in cases of malignant ovarian tumours is bad, even after apparently complete removal, whereas in benign cases a complete cure can be achieved, the wisdom of the time-old teaching that every ovarian tumour should be removed as soon as diagnosed becomes apparent.

The next most important consideration is the complexity of the normal ovary, both anatomically and physiologically. The ovary is apt to be regarded as a piece of tissue lying in the pelvis shooting out an ovum every month for nearly forty years, and then returning to the oblivion whence it came. No conception could be more dangerous from the clinicians' point of view. Its anatomical complexity is made necessary by its complex physiology, and this explains the great variety of tumours which the ovary can produce. Its constant functional restlessness and its relationship with other parts of the body may explain its readiness to produce tumours. In the future, if more knowledge is to be gained concerning these tumours, the lethargic attitude to ovarian function, which has perhaps been brought about in no small measure by the commercialization of the ovary of the men, must be abandoned.

SIGNS AND SYMPTOMS

Abdominal swelling—This is the most constant sign. Naturally it depends on the size and to some extent the situation of the tumour, and it is the commonest reason for seeking advice. It is usually slow in developing but may be quite sudden, specially with malignant tumours. The swelling is more often inclined to one side of the abdomen, but it may lie in the midline. These characteristics help to differentiate it from other abdominal swellings. The history of the swelling is

often more than a year, thus being longer than that of a full-term pregnancy. The eccentricity of the tumour is not often found in uterine tumours or in a full bladder. Its usual smoothness is unlike a mass of fibroids, and percussion with resonance in the flanks and dullness over the tumour serves to differentiate it from ascites or a mass of distended bowel.

Pain of some degree is more common than is usually thought. It is said to signify malignancy, torsion or rupture, but many uncomplicated and simple tumours are associated with pain of some degree. It is therefore essential when a woman complains of lower abdominal pain, even if there is no swelling, to make a pelvic examination to exclude ovarian tumour.

Loss of weight—This is often apparent and is common in malignant tumours but rare in benign ones. If it is not apparent it is a valueless sign unless the patient can produce an accurate weight chart, which she seldom can.

Urinary symptoms—These exist in about a quarter of the cases but they may be due to other causes. Frequency is the most common. Retention occurs only when the cyst or a loculus of it becomes impacted in the pelvis.

Alimentary symptoms—Vomiting is seen occasionally with uncomplicated tumours. When torsion occurs it is a common sign. Constipation may be met with in large malignant tumours.

Menstrual disturbances—These are uncommon in cases of ovarian tumours thus helping to differentiate them from fibroids, when menorrhagia predominates and pregnancy, when amenorrhœa is the rule.

Dysmenorrhœa—This is not common, but may be met with in cases of ovarian dermoids.

TYPES OF OVARIAN TUMOUR

BENIGN TUMOURS—*Pseudomucinous cystadenoma*—This is the most common of all ovarian tumours and may reach an enormous size. I have removed one weighing more than three stone. They are particularly symptomless, usually giving rise to a swelling only. They are most common between the ages of thirty and sixty and are usually unilateral.

Papillomatous cystadenomas resemble the former but contain actively grown papillomas. These may invade the cyst wall and cause rupture or local implantation. They are regarded by some authors as potentially malignant. In some the papillomatous development is intracystic and in others extracystic. The latter are easily recognizable at operation.

Dermoids are among the more common tumours arising from the ovary. They may be found at any age but are common in young women. They are usually unilateral and, according to some authorities, arise more commonly from the right than from the left ovary. In my own series there were forty cases. In only two was the tumour bilateral, whilst in the remainder more arose from the right than from the left ovary, but the series is too small for an accurate observation.

They are most interesting tumours and their contents are well known. Sebaceous material is always present, hair and teeth commonly. Any tissue can be found and I have seen an almost complete cerebellum present in one of these tumours. They do not as a rule grow much larger than a grapefruit and this fact is responsible for their liability to torsion. Pain is often present apart from torsion, and

have noted the frequency of dysmenorrhœa in these cases. Most small ovarian tumours lie behind the uterus. Dermoids frequently occupy the utero-vesical pouch, an occurrence common enough to be of diagnostic significance. Most of them feel semi-solid on examination and a skiagram may show the presence of teeth or bone. Malignant change may occur in dermoids. Stubler and Brandess (1924) claim that this occurs in 4.5 per cent. of ovarian dermoids.

Fibromas are the most common innocent connective tissue tumours of the ovary. They may be bilateral, and are often associated with ascites.

Meig's syndrome—This is seen in cases of ovarian fibroma. In this particular syndrome the tumours are associated with ascites and hydrothorax. Its importance is that the tumours are benign and may be mistaken for advanced malignant tumours with secondaries and unless recognized these patients may be condemned to years of suffering, whereas after removal the effusions clear up spontaneously. It was given the name Meig's syndrome because it was brought into prominence by Meig (1939). In actual fact it was first noticed some fifty years previously by Lawson Tait.

MALIGNANT TUMOURS—The frequency of secondary carcinoma in the ovary is often stressed, and whilst this remains true of post-mortem material it must be remembered that from the clinicians' point of view nearly 80 per cent. of the tumours seen are primary ovarian.

Malignant epithelial tumours—Those most commonly seen are malignant papillomatous tumours, malignant pseudomucinous tumours, and more rarely solid carcinoma. These tumours present much the same symptoms as the benign ones, with three important exceptions, namely, ascites is common and pain of a severe nature is an early symptom. Also fixity to surrounding structures and secondary nodules in the pouch of Douglas are important diagnostic signs. The growth of these tumours is usually slow and so long as the capsule is not invaded metastases usually do not occur. As soon as the capsule is invaded, local and finally general metastases rapidly occur. The solid ovarian carcinoma is highly malignant and often remains symptomless until long after it has become inoperable.

Metastatic carcinoma—Almost any malignant tumour in the body may metastasize to the ovary. There are two types, those which resemble the parent tumour, and Krukenburg tumours. These latter are secondary to gastric and colic carcinoma and do not histologically resemble the primary growth. Whenever a malignant ovarian tumour is removed it must be submitted for section and other common sites of carcinoma should be examined.

Malignant connective tissue tumours—These are rare and do not warrant special mention.

Rare ovarian tumours—Three most interesting tumours fall into this category—

- (i) Granulosa-cell tumours
- (ii) Dysgerminoma
- (iii) Arrhenoblastoma

The first should be regarded as malignant. It produces a feminizing hormone and may give rise to precocious sexual development, or menstruation in the aged.

The second may behave as a benign tumour or may show excessive malignancy. It does not produce any hormones.

The third is rare and has a masculinizing effect on its host.

TREATMENT

The treatment of all ovarian tumours is surgical. The operation of ovariectomy, first performed by MacDowell in America in 1809, and perfected by Spencer Wells at the Samaritan Hospital, London, is now a commonplace occurrence in modern gynaecological practice, so commonplace in fact that people have ceased to think about it and fail to realize that it may be unnecessary. To Bonney, more than to any one, surgery owes a most important modification of this operation when applied to benign tumours, for it was he who taught the value of partial ovarian resection in young women. Unfortunately large numbers of gynaecologists have paid no heed to his teaching. Two cases will illustrate its value —

(1) A young woman doctor aged twenty-five suffered for some years from osteoarthritis of the hip. One night she was seized with pain in the right iliac fossa, and was admitted to hospital with a diagnosis of appendicitis. Laparotomy was performed by a general surgeon who found a twisted right ovarian dermoid. This he removed. He examined the other ovary and found another dermoid and removed that also. Within two months of the operation the most severe menopausal symptoms occurred and her arthritis increased in intensity. This woman was left in a most unfortunate state, all the more so as she was at that time engaged to be married.

(2) This patient was a married woman aged thirty-five. An ovarian cyst was discovered at a welfare centre but the antenatal officer failed to realize its importance. The patient was allowed to go to term and had a breech delivery of a still-born baby in which the tumour caused some trouble. Six months later I saw her and operated for removal of five dermoids from her right ovary and three from the left, leaving her with two normal ovaries. She menstruated normally after the operation and recently had a normal delivery of a living child.

Recently I resected a multilocular cystadenoma weighing ten pounds from the right ovary of a girl of twenty, and on another occasion I resected a cyst from each ovary and performed a multiple myomectomy at the same time on a young woman who subsequently became pregnant.

Care must be taken not to damage the cyst on removal and its histology must be determined. I would rather resect a malignant tumour and have to perform a secondary operation than waste any part of a young woman's ovary, even if the disease is unilateral. Fortunately the number of malignant tumours in young women which cannot be recognized at operation is excessively small.

The treatment of malignant tumours is a different story. Removal of both ovaries and uterus is indicated. If secondaries are present the main mass should be removed for the patient's comfort, and it is here that X-rays are of great use. As the sole means of treatment deep X-ray therapy is occasionally useful as a palliative, but these tumours are not usually highly radio-sensitive and the dosage falls off rapidly as the rays penetrate towards the centre. In consequence, the results of this treatment are not often encouraging. Radium plays no part in the treatment of carcinoma of the ovary.

COMPLICATIONS

Apart from malignant degeneration there are three complications of importance — torsion, infection and rupture.

Torsion is the most common complication. Its symptoms are usually described as sudden, severe pain in the abdomen, vomiting and nausea, all of which pass off and leave a localized tenderness over the tumour. In actual fact these are the symptoms of torsion with infarction. In every case I have seen these symptoms have been preceded by mild attacks of pain, occasionally with vomiting; these are the symptoms of torsion without infarction. In the case of a young woman, I now

regard it as absolutely imperative to operate before infarction takes place so that her ovary and tube may be conserved, and if these early symptoms are neglected ss of the ovary may become inevitable. It is stated in many books that resection nnot be carried out if a cyst is twisted. This is quite untrue. I have several times itwisted a cyst and resected the tumour leaving the ovary. In most infarcted mours the ovary cannot be saved, but I have recently applied to two cases the nciples applied to the resection of bowel in a strangulated hernia. Untwist the mour, apply hot towels and watch the effect. The distal part of the tube is a good uide. If it becomes pink resection can be carried out. If it remains almost black en it cannot. If adhesions are present then the infarction is long standing and section is impossible.

Infection is not commonly seen. When it is present there is abdominal pain, nderness over the tumour and a high temperature. Removal with drainage is ndicated.

Rupture is most often spontaneous, due to perforation of the cyst wall by apillomas, but it is sometimes traumatic as a result of a blow or fall. Removal s indicated.

OVARIAN TUMOURS IN PREGNANCY

These are not common. Small tumours are very liable to torsion in the puerperium, and it is likely that the sudden return of the uterus to the pelvis may initiate the novements of the pedicle which lead to torsion. I believe that removal of these ysts should be undertaken early in the puerperium.

In general, the treatment does not vary in the pregnant from that in the non-pregnant, except that operation should preferably not be performed in the first hree months of pregnancy, owing to the risk of abortion, and in the latter weeks of pregnancy the patient should be taken as near to term as possible.

Tumours obstructing labour—If such tumours have to be dealt with in remote areas and rupture of the uterus is imminent, if cystic they should be tapped through he posterior fornix, but this is bad treatment. The obvious thing is to remove he tumour, and in this case I cannot emphasize strongly enough how thoroughly unjustifiable it is to perform a Cæsarean section first or to do it just because the abdomen is open. If the tumour cannot be brought out or is solid, the pregnant uterus must be everted. After removal, close the abdomen and deliver the atient with forceps at full dilatation to prevent undue strain on the incision.

I have only once performed a Cæsarean section in such a case. The ovary was very close o the uterus and after removal there was free hæmorrhage which I could not control with utures. I performed a lower segment operation and the retraction of the uterus immediately stopped the bleeding.

Partial resection is quite possible in pregnancy and I have twice done it on patients in labour.

CONCLUSION

I would plead again for a reconsideration of the usual attitude to ovarian surgery n the young and, when possible, one of conservatism should be adopted. Finally, I would recommend the history of ovarian surgery as set out in the Spencer Wells eatures (1878). A more interesting narrative has not been written.

References

- Meig, J (1939) *Ann Surg*, 110 731
 Stubler, E, and Brandess, T (1924) *Warsburg Abhung*, 21, 191
 Wells, Spencer (1878) *Brit med J*, 1

THE COMPLICATIONS OF GALL-STONES

By R J McNEILL LOVE, MS, FRCS

Surgeon, Royal Northern and Metropolitan Hospitals

THE incidence of many surgical conditions appears to be diminishing. The acute intussusception is much less common now that child welfare centres are disseminating knowledge regarding the feeding of babies. Again, carcinoma of the tongue occurs less frequently now that three of the exciting causes of chronic superficial glossitis, i.e., "syphilis, sepsis and spirits," operate to a dwindling degree. Furthermore, oral cleanliness and more rigid medical regime in the prodromic stages have greatly reduced the number of peptic ulcers. Gall-stones, however, still occur frequently, and are possibly becoming even more common, as young patients seem to be afflicted more often than was the case thirty years ago. Barrington-Ward has recorded three personal cases in children under ten years of age.

DIAGNOSIS

Space forbids a detailed description of the symptomatology of gall-stones. Typically the patient is "forty to fifty, fat, flatulent, and fertile." Distension after meals is perhaps the most constant symptom, and is often associated with pain in the region of the angle of the right scapula.

In this country a straight X-ray photograph reveals about 15 per cent. of gall-stones. In American clinics double this number are discovered by this means, possibly owing to refinement of technique, or else because American stones have a higher calcium content. A cholecystogram is often misleading. The gall-bladder may not fill owing to lack of absorption of dye from the bowel, impaired liver function, a stone in the cystic duct which prevents dye from entering the gall-bladder or, occasionally, the gall-bladder may be contracted. Not infrequently the cholecystogram appears to be normal when several small stones are present, which are not large enough to give rise to a "filling defect." In these cases a diagnosis must be made on clinical grounds. A history of severe and sudden pain followed by jaundice is almost certainly associated with the passage of small stones along the common bile duct, and in such cases exploration should be urged.

The complications of gall-stones can be considered conveniently under the following headings—

INFLAMMATORY COMPLICATIONS

(1) *Gall-bladder*—Acute cholecystitis is sometimes the first indication of cholelithiasis, although acute inflammation occasionally occurs before sufficient time has elapsed to permit of the formation of stones. Typically, the patient is seized with sudden severe pain in the right hypochondrium, associated with a temperature of somewhat over 100° F. Local rigidity, possibly vomiting, and pain referred to the right shoulder complete the picture.

Acute cholecystitis is a condition which always gives rise to some degree of anxiety. Out of 107 consecutive cases reviewed by me, the mortality was 13 per cent. These included 38 subjected to immediate operation with a mortality of 21 per cent. Of the patients treated on expectant lines the mortality was 9 per cent.

McNeill Love, 1929) Most surgeons now treat acute inflammation of the gall-bladder by expectant measures, so the latter figure is more in accordance with present-day statistics

The advantages of successful expectant treatment are not only a lower mortality, but when the acute phase has subsided a cholecystectomy can usually be performed with reasonable safety; whereas in the case of an acutely inflamed gall-bladder mere cholecystostomy may be the only wise procedure

(2) *Pancreas*—The incidence of acute pancreatitis is about one case in every 1,000 surgical emergencies (Chamberlain, 1927) Until recent years the diagnosis of this condition was unusual before the abdomen was explored on the operating table More careful attention to clinical features now results in accurate diagnosis in the majority of cases The sudden onset, continuous vomiting, and cyanosis are all suggestive As with perforation of an ulcer, marked prostration is also present. As Moynihan pointed out, "shock" is an incorrect term to apply to this condition, as it is not associated with marked diminution of the blood pressure Abdominal rigidity varies inversely to the degree of prostration, and therefore is absent for a variable time after the onset of infection, i.e., during the period when prostration is still profound

About 50 per cent. of cases of acute pancreatitis are associated with gall-stones Occasionally, a gall-stone becomes impacted in the duodenal ampulla, which obstructs the opening of the pancreatic duct and allows infected bile to regurgitate into the gland. When no such obstruction is present it is assumed that gall-stones in the biliary passages initiate a reflex spasm of the sphincter (muscle of Oddi) at the duodenal ampulla, and as a result retained bile regurgitates along the pancreatic ducts A careful history will elicit the fact that most cases of acute pancreatitis have previously suffered from similar but less severe attacks, and this is often an important point in diagnosis

Formerly the treatment of acute pancreatitis was by laparotomy, with drainage of the gall-bladder, peritoneum, and/or the pancreatic region. The advantage to be gained by operation is that a cholecystectomy (or drainage of the common bile duct if the gall-bladder is contracted or inaccessible) decompresses the biliary passages and discourages further regurgitation of bile into the pancreatic ducts However, the mortality associated with operative interference is about 40 per cent This depressing figure has led many surgeons to withhold immediate operation in cases which can be diagnosed with reasonable confidence Small doses of morphonon, an electric pillow on the epigastrium, and continuous intravenous saline and glucose are important factors in expectant treatment It is found that, in spite of the intense intraperitoneal reaction, in the majority of cases the symptoms subside, or a localized abscess is formed which can in due course be safely evacuated Subsequently the biliary passages are investigated radiologically, and pathological conditions are subjected to surgical scrutiny If no pathological condition is discovered then a regime is prescribed which combats pancreatic insufficiency A low-fat diet and some pancreatic preparation (such as solution of pancreatin B P C, pancrobilin, panteric) are indicated. In this connexion the fact must be stressed that after cholecystectomy for gall-stones, chronic pancreatitis and resulting deficiency may persist, and dyspeptic symptoms still affect the

patient, whose radiant hopes of a cure after the operation are thereby sadly damped. I have already alluded to this sequel to operations for gall-stones, which does not seem to be realized as generally as the condition merits (McNeill Love, 1931).

Case report—A few years ago I removed a chronically inflamed gall-bladder, containing stones, from the mother of a medical friend. At the post-operative chat I told him that all other organs were apparently healthy, but in such cases some degree of chronic pancreatitis commonly existed, and it would be wise to prescribe some pancreatic preparation for the patient for a few months in order to combat pancreatic deficiency. The patient made a good recovery, but about a month later the son telephoned me to say that his mother was fairly well, but still troubled with flatulence, dyspepsia and abdominal discomfort. I commiserated, and after a moment's reflection, inquired as to what pancreatic preparation he had prescribed. After a pause, an agitated voice confessed that he had entirely forgotten all about it! (As the patient was the relative of a medical man I was not altogether surprised.) A suitable preparation was prescribed forthwith, and the pancreatic symptoms abated within a few days.

A pancreatic regime can be interrupted after two or three months, continued if symptoms reappear, and usually terminated within a year of the operation by which time the gland has recovered sufficiently to function adequately.

(3) *Biliary passages*—Cholangitis is liable to occur as a result of temporary or intermittent obstruction of the common bile duct, such as is associated by passage or impaction of a calculus. Intermittent jaundice, so typical of an impacted calculus, is due to exacerbations of œdema in the wall of the duct adjacent to the stone, and not to any alleged "ball-valve" action.

Acute cholangitis is a serious, but fortunately uncommon, condition, and it is often associated with cholangiectasis. Clinically, the patient is obviously ill, rigors supervene and the liver is enlarged, firm and tender. Drainage of the common duct is urgently required, but only too often fatal cholœmia develops, and at post-mortem examination the liver is found to be distended with an ochre-coloured mixture of pus and bile.

Chronic cholangitis is a common accompaniment of prolonged cholelithiasis. Exacerbations of subacute infection, i.e., a "liver attack," are to be expected. These exacerbations are characterized by mental depression, slight rise of temperature, nausea, abdominal discomfort, and sometimes slight icterus. This syndrome was described by Charcot as "intermittent hepatic fever" (Brunschwig, 1942), and the old-fashioned but adequate treatment was a blue pill and a black draught.

BILIARY FISTULA

Gall-stones have been discharged by all the natural orifices. Ulceration from the fundus of the gall-bladder into the transverse colon may fortunately result in expulsion of the stone with the fœces. Occasionally a fistula forms between the stomach and gall-bladder, so that stones are vomited. Fistulae have been reported between the gall-bladder and the pelvis of the right kidney, with the result that stones were voided in the urine. A subphrenic abscess following local gangrene of the gall-bladder sometimes erodes the diaphragm and invades the lung, so that stones are expectorated. Finally, ulceration of the gall-bladder may allow stones to escape into the general peritoneal cavity, and migration into the pelvis results in the formation of a pelvic abscess, which ruptures into the vagina and, to the surprise of all concerned, stones are evacuated by this route.

In addition to discharge of stones via the natural passages, external fistulæ also occur, the most common site being at the umbilicus. All fistulæ are less common than formerly, owing to the fact that stones are more readily detected, their dangers better understood, and consequently operation is more frequently performed.

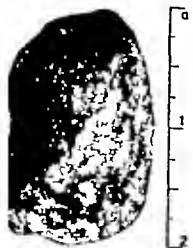


FIG. 1
Gall-stone removed from the lower end of the ileum.

From the clinical standpoint, the most important fistula is one which opens into the duodenum from the neck of the gall-bladder. If the calculus is less than one inch in diameter it will probably travel safely along the alimentary canal and may escape detection in the fæces. Any larger stone will almost certainly be arrested in the bowel, usually about two feet above the ileo-cæcal valve (fig. 1). This is one of the most dangerous varieties of acute intestinal obstruction, the salient features of which are pain, vomiting, distension and absolute constipation. As the obstruction is not complete, pain is not severe and distension is not marked until ileus supervenes. Also (as in the case of Richter's hernia) as the lumen of the bowel is not entirely occluded, absolute constipation is absent, i.e., a second enema given from half to one hour after the first, is returned with some fæcal material and perhaps a little flatus. The above divergencies from the textbook description of acute obstruction are apt to encourage a practitioner to procrastinate, but the one symptom which should put him on his guard is persistent vomiting which is unrelieved by all the usual measures. Furthermore, if a tape measure is passed beneath the patient and retained in position, measurement of the girth at the level of the umbilicus can be charted accurately every hour, without disturbance to the patient. This is much more satisfactory than a visual estimate, which is apt to be misled by alteration of contour. In cases of gall-stone obstruction a slow but steady increase of girth is usually measurable.

Obstruction of the ileum by a gall-stone occurs, as a rule, in old people. Whereas acute obstruction arising from a carcinoma of the colon is most common between the ages of sixty and seventy years, gall-stone obstruction occurs most frequently in the seventies or even eighties. The last three cases under my care were seventy-nine, eighty-three and seventy-seven respectively. If an old person vomits persistently for more than six hours for no obvious reason, gall-stone obstruction should be borne in mind.

One further point concerning diagnosis is relevant. The practitioner has probably been treating the patient, perhaps for many years, for recurrent attacks of "indigestion, wind, biliousness or spasms," which were in reality attacks of subacute cholecystitis. When obstruction supervenes, the practitioner visits the patient with the preformed diagnosis that this is a similar attack, which will subside as on previous occasions. Therefore he recommends the usual remedies, and at his next visit the following day is startled to find the patient obviously ill and vomiting copiously.

The prognosis of this condition is gloomy. The age of the patient, delay in diagnosis, exhaustion, dehydration and saline depletion, as a result of prolonged vomiting, all help to weight the scales against recovery.

In a small minority of patients the gall-stone is palpable as a hard and mobile lump, either in the right iliac fossa or in the pelvis

If the condition is reasonably suspected the abdomen is opened, light general or local anaesthesia being adequate. When located, the stone is milked upward for a few inches and removed through a longitudinal anti-mesenteric incision which is sutured transversely so as to avoid the possibility of a stricture. Intravenous infusion of saline and glucose, and small doses of omnopon, may help to tide the patient over the critical three days following the operation.

OBSTRUCTION TO BILIARY PASSAGES (FIG 2)

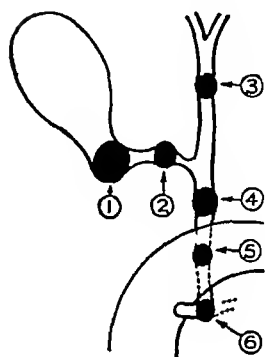


FIG 2

Usual sites of impaction of biliary calculi: (1) In Hartmann's pouch (2) In the cystic duct (3) In the common hepatic duct (4) In the supraduodenal portion of the common duct (5) In the retro-duodenal portion of the common duct (6) In the ampulla of Vater

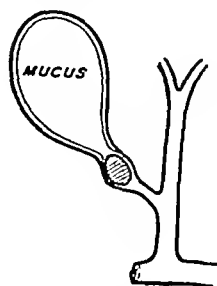


FIG 3

Mucocoele of the gall-bladder

Gall-stones may become impacted in the cystic duct (including Hartmann's pouch), the common bile duct or at the ampulla of Vater. This latter condition has already been considered.

Impaction of a stone in the cystic duct prevents escape of mucus from the gall-bladder, which gradually distends (unless completely fibrosed) until it accommodates a pint or more of mucus (fig 3). Clinically, a firm pyriform swelling is palpable, which is continuous with the liver, moves with respiration, and is often surprisingly painless. Infection is apt to supervene, with exacerbations of temperature and tenderness, which denote the conversion of the mucocoele into an empyema of the gall-bladder. A cholecystogram indicates that the gall-bladder does not fill, which is not surprising, as the cystic duct is plugged by a calculus.

Treatment consists in exposure of the gall-bladder which is then aspirated in order to reduce its size and facilitate examination of the biliary passages. Cholecystectomy usually presents no difficulties.

Obstruction of the common bile duct following impaction of a calculus is a condition which frequently gives rise to considerable anxiety. Typically, the patient develops jaundice a day or so after an attack of pain. Previous attacks may have occurred and subsided, owing to the calculus having either slipped back into the gall-bladder or safely negotiated the biliary passages. However, if impaction occurs the jaundice deepens and becomes intermittent, owing to variations in the intensity of oedema in the duct around the stone. Stools and urine vary in colour according to the amount of bile which seeps past the stone. Owing to previous fibrosis the gall-bladder does not distend, and in the large majority of cases Courvoisier's

law holds true, i.e., jaundice associated with an enlarged gall-bladder is not due to gall-stones.

For a time expectant measures are adopted in the hope that the stone will eventu-

y either slip back or pass on Saline aperients, glucose, moderate doses of urotropine or felamine (which contains cholic acid and urotropine) to discourage infection in the biliary passages, and belladonna to relax spasm, are useful measures Vitamin K prescribed in order to lessen bleeding should operation be necessary while the patient is still jaundiced If unsuccessful, a nice judgement is required in order to decide the optimum time for operation A reasonable time should be given in the hope that the stone will dislodge, but undue delay engenders increasing cholangitis, and even cholangiectasis, with ever increasing risk of cholæmia

An average time of waiting is about two weeks, but increasing jaundice and cholæmic symptoms, such as drowsiness, anorexia and vomiting, will precipitate the operation On the other hand, temporary improvements and but little deterioration of the patient's health may justify waiting in hope for a longer period

The operation, which is essentially a decompression of the biliary passages, must be well within the patient's physical capacity In toxic and cholæmic patients, particularly if obesity adds to the technical difficulty, mere drainage of the gall-bladder or common bile duct is all that should be attempted For some days "white bile" escapes from the tube, a certain sign of serious liver damage Pigment is then excreted in increasing amount, jaundice begins to disappear, and the general condition of the patient improves At a later date exploration can be undertaken with reasonable safety, and the stone can either be milked up to the opening in the common duct, pushed down into the duodenum, or removed from the duct through a separate incision, or possibly transduodenally

Whether the gall-bladder is removed at this or a subsequent operation, depends on the general condition of the patient and the technical difficulties concerned with the cholecystectomy in question

Less severe cases can be treated by removal of the stone at the initial operation, drainage of the common duct, and cholecystectomy either at the same operation or a subsequent one

NEW GROWTHS

Adenomas of the gall-bladder are found in about 2 per cent of cases of cholelithiasis An adenoma occurs as an umbilicated tumour at or near the fundus of the organ As it does not appear to give rise to symptoms or undergo any secondary changes it is merely of academic interest

Carcinoma of the gall-bladder is almost invariably associated with calculi, and it is stated that carcinoma occurs in 5 per cent of gall-stone cases This connexion provides convincing support for the theory that carcinoma is often inaugurated by chronic irritation The tumour is usually spheroidal-celled but, owing to prolonged irritation and consequent metaplasia, the growth may become squamous-celled The condition occurs insidiously and is usually discovered at operation More advanced cases are sometimes suspected or diagnosed clinically, in that an irregular and firm mass is palpable in the gall-bladder area If the neoplasm is confined to the gall-bladder, cholecystectomy offers a reasonable hope of cure More commonly, infiltration of the liver has already occurred If such infiltration appears to be localized, a wedge-resection with a diathermy knife should be attempted, but only too often the growth is found to have spread beyond the reach of surgical eradication

In a small minority of patients the gall-stone is palpable as a hard and mobile lump, either in the right iliac fossa or in the pelvis

If the condition is reasonably suspected the abdomen is opened, light general or local anaesthesia being adequate. When located, the stone is milked upward for a few inches and removed through a longitudinal anti-mesenteric incision which is sutured transversely so as to avoid the possibility of a stricture. Intravenous infusion of saline and glucose, and small doses of omnopon, may help to tide the patient over the critical three days following the operation.

OBSTRUCTION TO BILIARY PASSAGES (FIG 2)

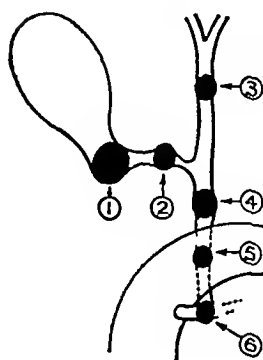


FIG 2

Usual sites of impaction of biliary calculi: (1) In Hartmann's pouch (2) In the cystic duct (3) In the common hepatic duct (4) In the supraduodenal portion of the common duct (5) In the retro-duodenal portion of the common duct (6) In the ampulla of Vater

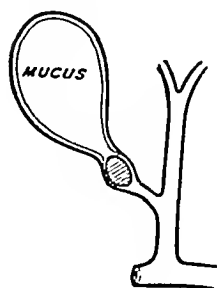


FIG 3

Mucocoele of the gall-bladder

Gall-stones may become impacted in the cystic duct (including Hartmann's pouch), the common bile duct or in the ampulla of Vater. This latter condition has already been considered.

Impaction of a stone in the cystic duct prevents escape of mucus from the gall-bladder, which gradually distends (unless completely fibrosed) until it accommodates a pound or more of mucus (fig 3). Clinically, a firm pyramidal swelling is palpable, which is continuous with the liver, moves with respiration, and is often surprisingly painless. Infection is apt to supervene, with exacerbations of temperature and tenderness, which denote the conversion of the mucocoele into an empyema of the gall-bladder. A cholecystogram indicates that the gall-bladder does not fill, which is not surprising, as the cystic duct is plugged by a calculus.

Treatment consists in exposure of the gall-bladder which is then aspirated in order to reduce its size and facilitate examination of the biliary passages. Cholecystectomy usually presents no difficulties.

Obstruction of the common bile duct following impaction of a calculus is a condition which frequently gives rise to considerable anxiety. Typically, the patient develops jaundice a day or so after an attack of pain. Previous attacks may have occurred and subsided, owing to the calculus having either slipped back into the gall-bladder or safely negotiated the biliary passages. However, if impaction occurs the jaundice deepens and becomes intermittent, owing to variations in the intensity of oedema in the duct around the stone. Stools and urine vary in colour according to the amount of bile which seeps past the stone. Owing to previous fibrosis the gall-bladder does not distend, and in the large majority of cases Courvoisier's

law holds true, i.e., jaundice associated with an enlarged gall-bladder is not due to gall-stones.

For a time expectant measures are adopted in the hope that the stone will eventu-

ally either slip back or pass on. Saline aperients, glucose, moderate doses of urotropine or fefamune (which contains cholic acid and urotropine) to discourage infection in the biliary passages, and belladonna to relax spasm, are useful measures. Vitamin K is prescribed in order to lessen bleeding should operation be necessary while the patient is still jaundiced. If unsuccessful, a nice judgement is required in order to decide the optimum time for operation. A reasonable time should be given in the hope that the stone will dislodge, but undue delay engenders increasing cholangitis, and even cholangiectasis, with ever increasing risk of cholæmia.

An average time of waiting is about two weeks, but increasing jaundice and cholæmic symptoms, such as drowsiness, anorexia and vomiting, will precipitate the operation. On the other hand, temporary improvements and but little deterioration of the patient's health may justify waiting in hope for a longer period.

The operation, which is essentially a decompression of the biliary passages, must be well within the patient's physical capacity. In toxic and cholæmic patients particularly if obesity adds to the technical difficulty, mere drainage of the gall-bladder or common bile duct is all that should be attempted. For some days "white bile" escapes from the tube, a certain sign of serious liver damage. Pigment is then excreted in increasing amount, jaundice begins to disappear, and the general condition of the patient improves. At a later date exploration can be undertaken with reasonable safety, and the stone can either be milked up to the opening in the common duct, pushed down into the duodenum, or removed from the duct through a separate incision, or possibly transduodenally.

Whether the gall-bladder is removed at this or a subsequent operation, depends on the general condition of the patient and the technical difficulties concerned with the cholecystectomy in question.

Less severe cases can be treated by removal of the stone at the initial operation, drainage of the common duct, and cholecystectomy either at the same operation or a subsequent one.

NEW GROWTHS

Adenomas of the gall-bladder are found in about 2 per cent. of cases of cholelithiasis. An adenoma occurs as an umbilicated tumour at or near the fundus of the organ. As it does not appear to give rise to symptoms or undergo any secondary changes it is merely of academic interest.

Carcinoma of the gall-bladder is almost invariably associated with calculi, and it is stated that carcinoma occurs in 5 per cent. of gall-stone cases. This connexion provides convincing support for the theory that carcinoma is often inaugurated by chronic irritation. The tumour is usually spheroidal-celled but, owing to prolonged irritation and consequent metaplasia, the growth may become squamous-celled. The condition occurs insidiously and is usually discovered at operation. More advanced cases are sometimes suspected or diagnosed clinically, in that an irregular and firm mass is palpable in the gall-bladder area. If the neoplasm is confined to the gall-bladder, cholecystectomy offers a reasonable hope of cure. More commonly, infiltration of the liver has already occurred. If such infiltration appears to be localized, a wedge-resection with a diathermy knife should be attempted, but only too often the growth is found to have spread beyond the reach of surgical eradication.

CONCLUSION

The numerous and formidable complications attributable to gall-stones and the importance of diagnosis and adequate treatment. Fortunately, the school which advocated palliative measures in suspected cases, unless some calcareous stone occurred, is dwindling in numbers. Such measures as olive oil to "dissolve stone," cholagogues to aid passage, and fat-free diet (a sop to the pancreas rather than to the gall-stone), have no place in the treatment of cholelithiasis. Such measures should only be prescribed if the patient is unsuited for operation, or obese that the operative risk is appreciably increased. In obese subjects a 6 months' reducing course is a wise procedure which not only eases the surgeon's task, but improves the tone of the patient in general, and that of the myocardium in particular.

Operative details are beyond the scope of this article, but it should be mentioned that the modified cholecystectomy devised by Professor Thorek of Chicago is a definite advance in biliary surgery.

Briefly, the operation consists in identifying and ligaturing the cystic duct and artery. The gall-bladder is then opened and the contents evacuated. The lateral walls are excised so as to leave that part of the gall-bladder attached to the liver *in situ*. This strip is then coagulated by diathermy and covered with a detached portion of falciform ligament omentum, and the abdomen can then be safely closed without drainage.

The advantages of this modification, as compared with the standard operation are—

(1) *Lower mortality*—about 2 per cent is the recognized mortality of the standard operation. Deaths are usually due to chest complications or pulmonary embolism. Diminished movement of the diaphragm, consequent on subphrenic irritation due to a puddle of bile and a drainage tube, encourages basal pulmonary atelectasis. Furthermore, reduction of the piston-like movement of the diaphragm, which is effective in maintaining the venous circulation, encourages venous stasis and consequent thrombosis, a precursor of pulmonary embolism.

Closure of a bile-free abdomen, without drainage, permits deep breathing and relative comfort as soon as the effects of the anæsthetic have subsided. The author publishes statistics, which show a mortality of 0.5 per cent, agreeing with figures obtained by my colleague and myself after several years' experience of the operation (Bailey and McNeill Love, 1939).

(2) *Smoother and shorter convalescence*—Non-fatal chest complications, which are irksome for the patient and a worry to the surgeon, are far less common. Less pain and discomfort are experienced by the patient, who is also spared the removal of a slimy, bile-sodden dressing once or twice daily, also the time of the nursing staff is conserved if no dressings are required. In addition, the wound heals by first intention and a firm scar results, which is unweakened by any aperture necessitated by the introduction of a drainage tube.

The illustrations are from *A Short Practice of Surgery*, by H. Bailey and McNeill Love, by permission of Messrs. H. K. Lewis & Co., Ltd.

References

- Bailey, H., and McNeill Love, R. J. (1939) *Brit. med. J.*, 2, 682.
 Brunschwig, A. (1942) "Surgery of Pancreatic Tumours," St. Louis and London, 193.
 Chamberlain, D. (1927) *Brit. J. Surg.*, 14, 390.
 McNeill Love, R. J. (1929) *Lancet*, 1, 375.
 — (1932) *Med. Soc. Trans.*, 26, 100.

SOME PRINCIPLES IN THE TREATMENT OF BURNS

By R H FRANKLIN, F.R.C.S

Surgeon, Emergency Medical Service, British Postgraduate Medical School

THE introduction of tannic acid treatment was a milestone in the management of burns, to-day the method has been largely abandoned and its place taken by a number of procedures. The result is that in many respects the treatment of burns is less satisfactory now than it was ten years ago. This is due to the conflicting advice which is given as to details and the neglect of first principles. It is unreasonable to expect that one method of treatment will suffice for all types of burn and scald and, more important still, for every circumstance in which the practitioner and his patient may find themselves. It is the purpose of this article to discuss some of the principles involved in treatment, and to consider the advantages and difficulties which may be associated with different methods in common use.

At the outset it may be stated that no one method of treatment is suitable for every burn under every set of conditions. This apparently obvious assertion is necessitated by the extreme dogmatism which characterizes, and also mars, many of the most helpful views put forward on this subject. One great difficulty which always gives rise to confusion is associated with the respective functions of "first aid" and what may be termed "final treatment," and this arises from the fact that the injury of burning may represent anything from a trivial lesion which the body will deal with successfully whatever treatment is applied, to what may constitute one of the gravest injuries met with in surgery. The surgical treatment of ruptured peptic ulcer would not be so generally successful as it is to-day if the willing first-aid worker made the incision in the abdomen before the patient came to hospital, nor would the skin-tight plaster maintain its popularity if it were general for a patient with a Pott's fracture to return to work in a well-conceived but ill-executed plaster without any reference to a medical practitioner. These examples may sound absurd, but it is largely because of comparable misconceptions in dealing with burns that tannic acid has fallen into its present disfavour; and a method which is essentially a major procedure, only to be undertaken by someone properly trained and under conditions suitable for carrying out a major surgical procedure, has been largely discredited because in so many cases treatment was left at the first-aid stage.

AIMS OF TREATMENT

The aims of treatment are simple—(1) To prevent the death of the patient by controlling or making good the fluid loss and by preventing if possible the occurrence of that much criticized but very conveniently named condition of "shock"; (2) to anticipate and when possible prevent infection, (3) and to minimize so far as possible any resultant deformity. These admirable aims cannot always be achieved by the same method, and in certain circumstances the decision has to be made to forgo cosmetic results in order to keep the patient alive. Some of the critics who are most clamant as to the advantages of their methods and the dis-

advantages of other peoples', would do well to reflect that but for the simple-minded but sound insistence on ensuring the survival of the patient before considering other aims, they would have no opportunity of making such sweeping statements on the mutilating results following methods different from their own "Better a living problem than a dead certainty," a remark often quoted by Grey Turner and attributed to the late Jeans of Liverpool, should be regarded as an axiom.

SHOCK

It is essential first to consider in detail the difficulties and dangers which beset the burnt patient and the means available for overcoming or preventing them. In a severe case the most urgent need is the prevention or treatment of shock. The most important factors contributing to this composite clinical condition are the loss of circulating fluid, painful nervous stimuli arising from the damage areas and, possibly, the absorption of products resulting from the burnt tissue.

The *loss of circulating fluid* may be counteracted by preventing further loss and allowing the body to bring the balance back to normal by the ordinary mechanism of eating and drinking. This method by itself, however, will not suffice in severe cases in which it is necessary to replace the fluid loss at once by serum transfusion. The prevention of further gross fluid loss may be partially achieved by the application of one of the tanning methods, although this procedure will not prevent the accumulation of fluid in the surrounding tissue. Limitation of fluid loss from the burnt surface and into the surrounding tissues may be achieved to some extent by the application of pressure in those parts of the body where this is applicable. For practical purposes this consideration usually limits the method to parts which can be readily bandaged. In certain circumstances no attempt to limit further loss may be made but the loss is made good by a serum transfusion which is continued until the burnt area recovers sufficiently to become impermeable. In most cases a combination of methods is used, further loss is limited and past loss is made up by the replacement of serum and by providing the patient with food and drink.

Painful nervous stimuli are dealt with by the administration of morphine and by local treatment to relieve pain.

The anticipation and *prevention of sepsis* is of fundamental importance and can only be achieved by an insistence on the necessity for treating a severe burn as a major surgical emergency. Prevention of deformity and restoration of function are aided by attention to the prevention of sepsis, always remembering that any burn which is more than second degree in severity can heal only by granulation unless steps are taken to replace the lost tissue by skin-grafting.

After this preamble it is proposed to consider some of the available procedures in detail.

TANNIC ACID TREATMENT

This method is placed first because of the honourable position it occupies in burn therapy and not because it is the method which has the widest application to day. Consider first the procedures which this form of treatment entails. First of all it is absolutely essential to remove from the damaged area every particle of dead epithelium—without introducing any infection. To carry this out properly it is essential to have full surgical amenities, it is not the type of treatment which lends

self readily to the conditions likely to be found in a small ship in a rough sea. Great patience is required to carry out the cleaning process properly. The patient is given a full dose of morphine, and if several areas are involved those not under immediate review are covered with saline compresses until their turn comes.

Debris and dead epithelium are now removed by combined use of non-toothed dissecting forceps and dry gauze, paying particular attention to the edges of the area, the damage usually extends farther than is at first thought. This process may take two or three hours but should be preferred to the harsh method of cleaning the area quickly under general anaesthesia. It is often found that after a time the patient complains of pain, and the analgesia may be reinforced by making an intramuscular injection of morphine ($1/8$ or $1/6$ of a grain for an adult). This injection

usually produces the desired effect in under ten minutes. Refreshment for the patient during this tedious procedure must not be neglected, and if there is a good team of assistants and nurses it need not be withheld from the medical staff, who can work on the patient in relays.

This meticulous and systematic process of "cleaning" is the basis of other forms of treatment to be described and, if success is to be attained, it must be carried out with a care which cannot be over-emphasized. High surgical training is not a necessary qualification, and a conscientious nurse who has been shown what to do is able to carry out the process satisfactorily. Each area which has been "cleaned" is tanned with a solution of $2\frac{1}{2}$ per cent tannic acid, which is sprayed on lightly and evenly. Care is taken to allow the first coat of tan to dry before applying the next, and for this purpose an electric hair dryer is of value. It is when the process gets to this stage that several members of the team may be usefully employed, one to pick off burnt epithelium, another to use the spray, a third the hair dryer—and a fourth may ply the patient with sandwiches and cups of tea!

It is important to know what to aim at and what to expect in the way of a tan. Using the weak solution advocated, no visible tan can be expected in under half a dozen sprayings, but by using the hair dryer these half dozen sprayings can be accomplished in perhaps forty-five minutes. It will be noticed that exudation of serum and also pain cease before any tan is visible. Spraying should stop as soon as a thin brown tan is visible. Enthusiasts who produce a thick pie-crust have played an important part in making the method unpopular. After the tan has formed, the surrounding skin and the edge of the tan may be painted with 1 per cent aqueous solution of gentian violet to prevent infection gaining entrance. It is wise to repeat this painting on subsequent days. The shrinkage of the tan which is said to occur is not very noticeable if the weak solution has been used, and in some cases the so-called shrinkage is really caused by the fact that the damaged epithelium extended farther than was originally thought. No attempt should be made to remove the tan as healing occurs, it will be found to peel off spontaneously without any trouble.

Tannic acid is useful in certain cases and in certain circumstances—the circumstances are perhaps more important. Tannic acid should not be employed unless the patient can be received quickly and uncontaminated at a hospital or station sufficiently well constituted to deal with a major surgical problem. It should not be used on areas covered with hair, over joints, near the eyelids or lips, or in

periods up to three weeks. Frequently the burn is re-dressed at the end of ten days, because the patient complains of slight discomfort. At the re-dressing the surface should again be insufflated with sulphanilamide powder, fresh tulle gras applied and bandaged on as before. If tulle gras is unobtainable, vaseline gauze may be used instead, but it does not seem to have nearly such a stimulating effect on the growing epithelium. It must be emphasized once again that greasy dressings are permissible only if safeguards against sepsis are employed, and only if serum loss is controlled by firm bandaging.

GENERAL MEASURES

The "shock" associated with burns is attributable to fluid lost from the circulation, either into the tissues or from the burnt surface to the exterior, and to the effect produced by painful stimuli. The pain factor in the production of shock is satisfactorily dealt with by the injection of morphine ($1/3$ of a grain is suitable for a strong adult). If the effect of the injection wears off during the cleaning-up process an intravenous injection should be given. Food and drink should be given liberally if the patient is fit enough to take them. This simple restorative measure has been placed high on the list because it is so commonly neglected. But the restorative measure of inestimable value is the infusion of serum or plasma. Many patients are saved thereby, who would have died in the days before its introduction. Almost all really severe cases will be benefited by it, and many will die if it is withheld. Whenever possible, intravenous serum should be given immediately, delay will result in irreversible changes occurring which no amount of serum will counteract. It is important not to overtreat with serum, and if, to take the example of otherwise healthy young adult, the systolic pressure has been raised to 110 mm. of Hg, and is still rising, it is wise to discontinue serum and rely on the mechanical action of the body to complete the recovery. If intravenous therapy is not available much can be achieved by giving adequate food and drink by the mouth.

Serious criticism has been levelled at the use of heat in the treatment of shock. The practice of placing a semi-conscious patient under a hot cradle for hours on end, or of leaving an electric blanket in position for so long that the bare heat cannot be comfortably placed on the patient's abdomen, cannot be deprecated too strongly. Not only are valuable quantities of fluid lost by sweating but the protective vasoconstriction mechanism is undone. Overheating must therefore be guarded against and this can often only be ensured by the surgeon himself examining the patient frequently. The reactionaries to the "overheating school" have gone to the opposite extreme—leaving the patient with perhaps very little covering, shivering miserably and getting what comfort he can from a serum infusion. As to the criterion of what constitutes the correct temperature of the patient, few medical practitioners consider the comparatively simple method of asking the patient if he feels warm enough and of making the necessary adjustment.

FIRST-AID MEASURES

Anyone asked to advise suitable first-aid measures for a perforated peptic ulcer would rightly say that apart from getting the patient to a hospital quickly there are none. The same advice holds good for a really severe burn. What makes the advice so difficult in the case of burns is that all gradations of severity are met with, from those of such gravity that only the most prompt and skilful attention can

prevent death, down to comparatively minor cases which will get well without any ill effects, provided that they are kept clean. It is the cases nearer the latter end of the scale which may be treated with tannafax, gentian violet, triple dye, or any other reputable form of treatment. They would get equally well with a dry dressing left in position until healing occurred—the only difference made by the treatment, and an important difference from the patient's point of view, is that some of the treatments mentioned would result in a speedy relief from pain.

Certain minor burns and scalds may be safely dealt with under first-aid conditions, but if treatment has been given by a nurse or first-aid worker the case should be referred to a medical practitioner who will not necessarily have to carry out any "final" treatment. Cases falling into this category should not be more than first or second degree in severity, the burns should not exceed approximately one-and-a-half inches in length, nor should those burns which occur on the face, hands, feet or genitalia be included. The treatment which may be used in these comparatively minor cases may be any of those mentioned. The important point to emphasize is that the worker under first-aid conditions must do nothing to contaminate what is essentially a clean wound. The small second degree burn on the forearm which occurs in civil practice from inadvertently touching a hot stove is an example of what may be called a "minor burn." This type may be treated under first-aid conditions by painting over and around the burn with gentian violet (1 per cent. in water) snipping the blister with sterile scissors and bandaging in position a pad of gauze on to which has been squeezed tannafax from a tube. The dressing is left until healing occurs. This particular treatment has been described in detail—not because it has great advantages over other methods but because it illustrates the sort of instructions which may be issued to first-aid workers who are called upon to treat burns and who may be far removed from more skilled aid, removed not perhaps by distance so much as by time.

For the severely burnt patient who can be taken quickly by ambulance to a hospital it is wise to give instructions that nothing should be done other than to wrap the affected parts in a sterile towel if possible or, failing this, a clean household towel or sheet, cover the patient with a blanket and send him off as quickly as possible.

What of the severely burnt patient who cannot possibly receive "final treatment" for some hours? This type of case is one of the great problems of war surgery. A good procedure under these circumstances is to snip the blisters with sterile scissors, dust the areas carefully with sulphanilamide powder, cover them with tulle gras or vaseline gauze and bandage firmly with crêpe bandage. An attempt is thus made to control sepsis by the use of sulphanilamide, and the further loss of serum is being limited by pressure. Morphine will usually be required, but above all full use must be made of the restorative powers of food and drink.

CONCLUSION

No one method of treatment is the best for all burns under every condition. The principles of treatment must be insisted upon rather than a slavish regard for any particular method. Any particular treatment which is chosen must be applied meticulously. A clear distinction must be drawn between "first-aid" and "final" treatment.

especially at hay-time Laryngitis had been frequent. As a child, she had seldom completed a term at school, owing to heavy colds and bronchitis

(2) Contracted fields, especially the right.

In October, a septal resection and right middle turbinectomy had lessened the pain about the right eye. In December, intra-nasal medication was begun. Two weeks later, she was able to use her eyes for needlework for hours without the pain, which for years had followed such use, and the senses of smell and taste were keener. After two months' treatment, the pain in head and eye had ceased and also the fits of sneezing, and she felt better than she had ever been in her life. After eighteen months, her condition was truly excellent, but she occasionally had pain in the region of the gall-bladder, this was investigated and gall-stones demonstrated. In 1932, the gall-bladder, with 17 stones, and the appendix were removed. These were secondary infections, likely to give further trouble later on, if left, but obviously not the cause of her ill health, since she had fully recovered before their removal.

After about five years, at the age of fifty-seven, she bought and learned to drive a car, passed the test and has continued to drive since. Now, in 1943, she remains perfectly well and leads an active life for her age of sixty-five, as head of a play-centre.

For nearly fifty years, this patient had been in a condition of chronic ill health, often severe. When at last the sinusitis, which had given evidence of its presence throughout, was recognized and treated, even so late as at the age of fifty two, health was completely and permanently restored. The pain in head and eye, which had persisted for thirty-six years, cleared in two months when the sinuses were successfully drained.

Case 6—A woman of sixty-two, first seen in 1926, presented a most curious strange appearance, inasmuch as her right upper eyelid drooped, whereas the left was retracted. The condition had been present for four months. About nine months previously, the patient had alarmed her friends by the loss of over two stone in four months, with considerable diminution in her previously excellent health, without anything to account for it so far as could be ascertained by any of the four medical men who had seen her, although two of them were well-known consultants, the one a physician and the other, seen three months later, a surgeon.

After such careful expert examination, a systemic cause for the eyelid condition could be eliminated, and search was made for a local cause. There were two clues—

- (1) For six years the patient had entirely lost the sense of smell.
- (2) For a year, there had been a creamy, yellow discharge from the right side of the nose, and every morning, a mass of muco-pus was cleared from the right side of the throat.

Clinical examination of the nose revealed only hyperæmia, more marked on the right side. X-rays only threw suspicion on the right antrum which, however, was exonerated when irrigation returned clear, with not even a flake of mucus. Then something happened which confirmed the diagnosis of sinusitis. Shortly after the antral irrigation, the patient noticed some return of the sense of smell, and the discharge lessened. It was then determined to irrigate all the sinuses, from all of which the washings returned perfectly clear, but the sense of smell became much keener, discharge ceased and the patient felt much better.

No change was noticed in the eyelid condition, although the son, a medical man, was confident there was an improvement in three weeks. She was given a spray of argyrol 10 per cent to be used twice daily, which she carried out intermittently for three months. Six months from the second irrigation the lids showed no abnormality whatever, there was no nasal discharge and the patient was in excellent health. The sense of smell was still slightly defective, but nine years later, when she reported, it had become completely normal.

The diagnosis in this case depended on symptoms and the effect of treatment, but there was one positive objective test. The washings from all the sinuses gave a culture of *Staphylococcus albus*. This was regarded as contamination, although the Watson Williams' method, which should exclude this possibility, had been followed. As in case 2, there can be little doubt that this organism was the lethal agent. The existence of an active focus of infection in the sinuses, thus demonstrated, throws light on the previous obscure illness. The patient had not mentioned

her nasal discharge, not connecting it with her ill health, and it had not occurred to any of the four medical advisers to inquire. Had they done so, much of the methodical work in the otherwise meticulous examinations would have been unnecessary, for the sinusitis was sufficient explanation of the general as well as of the later local symptoms. The consulting physician, with whom I afterwards discussed the case, had an opportunity later of seeing the patient again when called in consultation to one of her relatives. She then assured him she was in excellent health and he considered that her appearance fully justified her assertion. She was quite confident that her recovery was due to the nasal treatment, and he stated that the record would seem to teach that in the presence of vague and unexplained symptoms, the possibility of nasal sinus infection should be remembered.

This case illustrates once more how easily sinus infection may be missed, how serious such failure and how easily the disease may be conquered once recognized.

Case 7—A woman of forty-five, when first seen in 1929, complained of extreme nervous debility which had begun after a slight attack of influenza three years before. She suffered from severe headache, insomnia, "terrible" dreams, was giddy and had fallen several times, had lost weight considerably, had bouts of extreme fatigue, was depressed and, as her family practitioner had told her husband there was nothing the matter with her, had felt so hopeless that she feared suicide. Memory was very poor and she was quite unable to concentrate. Dysmenorrhœa had always been particularly severe with vomiting. She had just returned from a seven weeks' holiday, feeling worse. Indications of sinus infection were—

- (1) A cold the whole winter, with dry and crusted nose, pain over the right ear and mastoid, slight deafness and a ringing in that ear, occasional swelling of the right cheek and a choked feeling at the top of the nose which she could not clear. X-rays showed some dimness of the right antrum and ethmoid, and clinical examination showed signs of double ethmoiditis.

(2) Contracted fields

Three weeks in a private ward with frequent inhalations of friar's balsam largely restored the patient to a normal condition. In particular, sleep became excellent, and there was much post-nasal catarrh, formerly absent. After two more weeks in a nursing home, catarrh became free, the headache and giddiness were gone, she was rapidly putting on weight and sleeping the whole night through as she had not done for two years. In two-and-a-half months, with further intra-nasal medication, she was feeling better than she had ever done in her life. She remained under observation four years, well and active in her home and church life and, incidentally, entirely free from dysmenorrhœa.

In this case the sinusitis was obvious, but it had not been connected by either the patient or the family practitioner with her serious nervous condition.

CONCLUSION

The promptness and permanence with which all these seven patients were lifted right out of the category of "chronics," after prolonged periods within it, indicate a search for a clue in the para-nasal sinuses in every otherwise unexplained case of ill health. Such a clue can often be elicited on inquiry, in definite symptoms, though these may not be volunteered. Even if such are not forthcoming, the contracted fields of vision, the history of onset with some rhinological affection, and the past history of other results of a septic focus will be sufficient to clinch the diagnosis. Confirmation follows when as the result of drainage the fields steadily widen, as in these cases, and the health is restored. Dysmenorrhœa or excessive menstrual loss, or both, was present in three of the cases. The prompt and permanent relief of these conditions as a result of the nasal drainage, suggests that they were secondary results of the sinus sepsis.

THE INTERPRETATION OF PHYSICAL SIGNS

III—IN DISEASES OF THE NERVOUS SYSTEM

By C M HINDS-HOWELL, M D, F R C P

Consulting Physician, National Hospital for Paralysis and Epilepsy, and St Bartholomew's Hospital

THE importance of taking an accurate clinical history is strongly impressed upon all medical students. In the investigation of a patient suffering from some disorder of the nervous system such a history may be of fundamental importance, for on it may depend the possibility of making a correct diagnosis. Not only must the present evolution of symptoms be obtained, but the past must also be explored for any incident which may clarify the significance of some presenting symptom. For instance, a patient may complain of difficulty in walking and is found to have an extensor type of plantar reflex. Unless specifically inquired for, the occurrence of some transitory loss of visual acuity—which may have happened a number of years before—is quite likely to be omitted by the patient. Yet such a symptom would probably clinch the diagnosis of disseminated sclerosis. Inquiry must of course include the family history, as this may throw light on familial diseases—epilepsy and so on.

Whilst the history is being taken, light will be thrown on the patient's speech (dysarthria, aphasia, stammer), his education, mental capacity and emotional reactions. From these fruitful observations may be made which may assist in arriving at such diagnoses as frontal tumours, disseminated sclerosis, general paralysis of the insane, bulbar palsy, paralysis agitans, and it will also serve to facilitate a reply to the first question which the examiner must put to himself, i.e., "is the patient suffering from an organic or a psychoneurotic condition"? For the purposes of the present article, it must be assumed that the answer is organic.

The examination must then proceed in a methodical manner. This must include not only the whole of the nervous system but the whole of the patient. Frequently the signs of disease in the nervous system which may cause the presenting symptoms are found to be merely a manifestation of a primary disease elsewhere. For instance, in the blood (pernicious anæmia and subacute combined degeneration in the spinal cord), vascular disease with hypertension (hemiplegia, papilloedema, retinal hæmorrhages), cardiac disease (endocarditis, hemiplegia, cerebral aneurysm), pulmonary disease (bronchiectasis and cerebral abscess, or bronchial carcinoma and secondary deposit in the lungs), prostatic carcinoma (with secondary deposit in the brain), and so on.

THE CRANIAL NERVES

So far as the examination of the nervous system goes, a methodical routine should always be followed: the cranial nerves, motor and sensory system, reflexes, gait; with lumbar puncture, Wassermann in blood and cerebrospinal fluid, and possibly a blood count as additional laboratory investigations.

It is quite impossible within the limits of this article to deal in a comprehensive

manner with the significance of all the physical signs which may be elicited in connexion with diseases of the nervous system. It is proposed first to take certain aspects of disorders of the cranial nerves.

(A) *VISION*—Visual fields and visual acuity should always be tested. The fields can be tested roughly by the confrontation test. Hemianopia, either homonymous or bitemporal, can be easily recognized by this method, and the presence of scotomas ascertained, although their actual extent is not accurately determined. A *right or left-sided hemianopia* is due to a lesion, either of the optic tracts, when it is likely to be complete, or of the cerebral path of the visual fields on their way to or in the occipital cortex, when the hemianopia may possibly be incomplete. This is particularly likely to be the case with a lesion such as a tumour or abscess in the temporo-sphenoidal lobe, which interrupts some only of the visual fibres—at any rate at first—thus causing a quadrantic hemianopia.

Bitemporal hemianopia is due to a chiasmal lesion, which may be caused by a number of pathological conditions. Of these, pituitary tumours are the most common, but aneurysm, meningioma, syphilis, arachnoiditis, or thrombosis may also cause it.

Scotomas are usually due to retrobulbar neuritis, and of this the most common cause, in young adults at all events, is disseminated sclerosis. This is often the first symptom of the disease, and as a rule the examination of the rest of the nervous system is negative. Sometimes there is only a short interval before further signs appear, but the latent period may on occasion be a long one—

A female patient, aged forty, consulted me for a slowly progressive spastic paraplegia. When asked if she had had any nervous troubles in the past, she denied any, but when pressed she remembered that nearly twenty years before she had "lost the sight of one eye" for some weeks for which she gave the remarkable explanation that a tarantula spider had run over her face! The retrobulbar neuritis of those far-off days was the forerunner of her disseminated sclerosis.

Ophthalmoscopic examination of the fundus must be part of the routine examination. *Optic atrophy or papillædema* are the most common neurological findings. It is not possible to discuss all the causes of atrophy, but papillædema is a sign of increased intracranial pressure, though the causes of that condition are many. It is important to remember that it occurs in malignant hypertension, and in this case hæmorrhages in the retina are likely to be prominent and the urine will contain albumin.

Hydrocephalus, however produced, may lead to papillædema. This is most important when it occurs as a complication of otitis media, acute or chronic, for the suspicion of intracranial abscess will surely arise. This conclusion may be strengthened by single or bilateral sixth nerve palsy. Lumbar puncture, if it produces a *normal* fluid under high pressure—300 mm. or more—will make the diagnosis of hydrocephalus clear and the outlook so much the more hopeful.

It is important to remember that a high degree of papillædema may exist for a time without any impairment of vision. As an illustration of the importance of ophthalmoscopic examination, let me quote the following—

A girl of twenty-three was admitted to hospital with a pleural effusion and raised temperature. The effusion was aspirated and was thought to be tuberculous. About two weeks later, the girl had a series of epileptic fits over a period of three days. Inquiry showed

that eighteen months previously she had had an epileptic attack. She had the scars of a number of small ulcers just above her ankles on both legs. It was found on further inquiry that she had suffered from headache for eighteen months, and on several recent occasions had vomited without warning. She was found to have bilateral papilloedema, but no other abnormal signs. The pleural effusion, the scars on her legs, and the fits suggest that she may have a tuberculoma in the brain and that her fits are "symptomatic" and not idiopathic.

(B) *PUPIL REACTIONS*—Many types of abnormal pupil reactions are found, the Argyll-Robertson being the best known. Typically in this form the pupil should be small, often unequal in size and irregular in outline, and the iris frequently a pale blue colour from atrophy. The pupil is inactive to light, but should react briskly on convergence. The significance in 90 per cent. of the cases is neurosyphilis, a condition which may of course exist without the Argyll-Robertson pupil. It is important to differentiate the myotonic from the Argyll-Robertson pupil. In the former, the pupil is frequently moderately dilated and, though inactive to light, contracts *very slowly* on convergence and dilates as slowly again afterward. This pupil is often found associated with absent knee jerks. Because of this I have known the diagnosis of tabes dorsalis to be made, although other signs of tabes were wanting.

One case which comes to mind is that of a fine young athlete who was turned down by the medical officer of an important industrial concern, who refused to be convinced by arguments showing that the boy had not got tabes. However, I am glad to say that a more enlightened medical officer in a rival concern gladly accepted him.

(C) *OCULAR PALSIES*—Here differentiation must be made between those due to a peripheral nerve lesion of the third, fourth, or sixth cranial nerves on the one hand, and nuclear or supranuclear lesions on the other.

In the former, individual muscles will be affected, whilst in the latter conjugate movements of both eyes involved will be present. Perhaps the most common example of such conjugate paralysis is to be seen in recent cases of hemiplegia when the eyes may be found deviated, during the acute stage, towards the side of the lesion, i.e., away from the paralysed side.

Another example of conjugate paralysis may sometimes be seen as a sequel to encephalitis lethargica, when upward movements may be lost, whilst, following the same disease, spasm of conjugate movement upwards is met with in the distressing condition known as oculo-gyric crises. In these the eyes roll up involuntarily, and it may not be possible to get them down again until the patient has gone to sleep.

THE FIFTH CRANIAL NERVE—This nerve supplies by its three peripheral sensory branches the skin of the face and forehead and the mucous membranes of the eyes, nose and mouth. By its motor root the muscles of mastication are innervated. Loss of function in any or all of these branches may be caused by tumour, syphilis, aneurysm, inflammation and vascular lesions. An example of one type of inflammatory lesion is a virus infection of the Gasserian ganglion, often with maximal incidence on that part of the ganglion which receives the first ophthalmic division giving rise to the clinical picture of herpes ophthalmicus. Occurring perhaps more commonly in elderly subjects, it is often followed by the most intense and intractable neuralgia, which may persist for years. Unless great care is taken of the cornea, the formation of opacities may interfere with vision in the affected eye and add to the miseries of the patient.

Of great importance, though devoid of physical signs, are the different forms of neuralgia of the fifth nerve. Apart from post-herpetic neuralgia, these may be divided into two main groups—(a) reflex neuralgia, and (b) tic douloureux. Reflex neuralgias are fortunately the commoner of the two. Everyone is only too familiar with neuralgia set up by dental causes. This has, however, the disadvantage that it leads in many cases to the useless sacrifice of perfectly sound teeth for the attempted relief of trigeminal tic. It is important to recognize the neuralgia set up by an infected sinus or antrum, and to differentiate this from tic. These sinus neuralgias—which may be exceedingly severe—lead to a more constant type of pain than the intermittent lancinating stabs of tic. Another remarkable feature of sinus neuralgia is its periodicity, which again serves to differentiate it from tic. In many cases the pain recurs at the same time of day—a fact forcibly impressed on my mind by having myself had a neuralgia due to an antrum, which recurred each day at 10.30 a.m. and had practically passed off by teatime. A last point is that an *isolated* neuralgia of the first division, such as occurs with frontal sinusitis, is exceptional in tic.

THE SEVENTH CRANIAL NERVE—This nerve may be affected by the same pathological processes as have been mentioned for the fifth nerve, but in addition exposure to cold may produce a Bell's palsy, owing to the superficial position of the nerve as it emerges from the stylomastoid foramen. It is important to remember, however, that in many cases of Bell's palsy the condition is probably due to an infection, possibly the result of virus activity. Such an infection is quite certainly the cause of what is known as geniculate herpes. This is not a common condition, but it is important to recognize it. Pain in the ear is followed by a severe facial paralysis with the appearance of herpetic vesicles on the tympanum and in the external auditory meatus. The fauces are injected on the affected side, and vesicles—soon turning to small ulcers—may appear on the soft palate and anterior pillars of the fauces. There is often a febrile reaction. Unless care is taken, the condition may be mistaken for an acute otitis media, to which the appearance of an aural discharge from the ruptured herpetic vesicles in the meatus may add a spurious resemblance.

Brief mention must be made of another type of paroxysmal neuralgia which occurs—though fortunately but rarely—in connexion with the *ninth cranial nerve*. It is known as glossopharyngeal tic and is characterized by stabbing pain in the throat, which seems to pass up to the ear on the affected side, the latter symptom being due to the tympanic branch of the nerve. When established it is as intractable as trigeminal tic. The only effective treatment then is by surgery.

One of the most dramatic clinical pictures that can be met with in which several cranial nerves are involved is caused by *thrombosis of the posterior inferior cerebellar artery*. This vessel—a branch of the vertebral or basilar arteries—seems to be unduly liable to thrombosis. The clinical picture which results is most baffling unless the anatomy of the lateral part of the medulla is remembered. It is then perfectly simple. I may remind readers that in this area the following structures are situated: the inferior cerebellar peduncle, the spinal root of the fifth cranial nerve, the motor nucleus of the ninth and tenth cranial nerves, a ciliospinal centre or nerve fibres which ultimately reach the sympathetic ocular fibres via the cervical sympathetic, and the spinothalamic fibres, carrying sensory impulses of pain and

thermal sensation from the opposite side of the spinal cord. The patient who has a thrombosis of this artery is seized with intense vertigo, often accompanied by pain in the face and vomiting. Consciousness is not often lost. As the acute phase passes off, the patient is found to have cerebellar ataxia on the side of the affected artery, loss of sensation on the same side of the face, ocular sympathetic palsy with small pupil and narrowed palpebral aperture, palatal paralysis and paralysis of vocal cord, all on the same side, whilst on the opposite side of the body, neck, trunk, arm and leg, there is loss of sensation to thermal and painful impulses. Although the onset is usually extremely severe, the majority of patients not only survive but make a good recovery.

An old friend, a keen sportsman, had a thrombosis of this artery when well over seven years of age. This was in the winter, but he was able to be out shooting in the following season.

THE MOTOR SYSTEM

Anatomically, there are concerned in this system the upper (pyramidal tract) and lower (peripheral motor nerve) motor neurons, the extra-pyramidal motor system and the cerebellum. Lesions of these motor paths will result in paresis or paralysis with alteration of muscle tone, muscular coordination, reflex activity and, in some cases, with muscular atrophy.

The effects of lesions of the upper and lower motor neurons can be compared in tabular form —

<i>Upper motor neuron</i>	<i>Lower motor neuron</i>
Paresis or paralysis either mono-, hemi-, di-, or paraplegic	Paresis or paralysis of peripheral nerve or groups of peripheral nerves
Muscle tone increased	Muscle tone diminished
No muscular wasting apart from disuse	Muscular wasting marked
Tendon reflexes increased, with possibly ankle clonus and extensor plantar reflexes	Tendon reflexes diminished or lost
Abdominal reflexes often absent	Abdominal reflexes absent (if affected)
Electrical reactions unaffected	Electrical reactions R D (reaction of degeneration)
Sphincters often affected	Sphincters usually unaffected

Lesions of the extra-pyramidal motor system result in alteration of muscle tone and involuntary movements. Familiar examples are paralysis agitans and the "Parkinsonian" condition following encephalitis lethargica. Muscle tone in these disorders is increased, but in a rather different manner from that which obtains following lesions of the pyramidal tracts. In the latter there is a selective increase in tone, this being preponderantly increased in the flexors of the upper and in the extensors of the lower limb. This gives rise to what has descriptively been termed "clasp-knife" rigidity. Following lesions of the extra-pyramidal motor system, the increase in muscle tone is global rather than selective (lead-pipe rigidity). Tendon reflexes are as a rule increased, but the plantar reflexes retain their normal type (flexor). The muscular rigidity in paralysis agitans results in the expressionless face (Parkinsonian mask), which is one of the most typical and diagnostic features of the disease. It also results in paucity of movement, hence disinclination to swallow and consequent dribbling, and loss of finer movements in the finger. Muscular power remains good, but is ultimately prejudiced by increasing spasticity.

The onset of this disease is frequently hemiplegic and may often be accompanied by but little tremor—a fact which may lead to errors in diagnosis. It would be fair to say that the most common cause of hemiplegia of gradual onset in late middle age is paralysis agitans. Involuntary movements which result from lesions of the corpus striatum (basal ganglia) in this instance take the form of tremor, as seen in flexion extension of wrist, pronation supination of forearm, or pill-rolling movements.

Lesions of the cerebellum may lead to some or all of the following symptoms: ataxia, loss of muscle tone, speech defect, nystagmus, muscular weakness, reflexes are not usually affected in any characteristic manner.

The cerebellum may be affected by tumour, inflammatory and vascular lesions, in disseminated sclerosis and degenerative conditions and certain rare familial disorders. The ataxia is the result of incoordination of muscular movement and is illustrated by nystagmus, intention tremor and a gait which resembles that of a drunken man. The speech defect is also the result of muscular incoordination and resembles that sometimes found in cases of disseminated sclerosis. A further way in which muscular incoordination can be brought out is by asking the patient to perform rapid alternation of movement—for instance, rapid pronation and supination of forearm. With a cerebellar lesion they will fail to do this efficiently on the affected side (dysidiadochokinesia). Each cerebellar hemisphere has a homolateral connexion with the spinal cord, unlike the crossed connexion of the cerebral cortex.

THE LOWER MOTOR NEURONE—The incidence of disease may be anywhere from the anterior nerve cell to the motor end plate in muscle and, as elsewhere in the nervous system, may be acute, subacute or chronic.

Acute anterior poliomyelitis affords the best example of acute disease. Although its incidence is highest in the young, it must not be forgotten that adults may be affected, also that *formes frustes* of the disease may occur. Except in epidemics, the latter type is likely to go undiagnosed, but a mild febrile reaction with headache and some rigidity of the neck are suggestive. Lumbar puncture with increase in cells up to 70 or 100—probably polymorphonuclear at this stage—would support the diagnosis. The protein content of the cerebrospinal fluid, not much increased at first, gradually rises as the number of cells falls. At this stage the patient may complain of muscular pains, perhaps severe, on account of which a diagnosis of acute rheumatism may be made. It is important to note that the pains are in the muscles and not in the joints. The appearance of a flaccid palsy in various segmentally supplied muscle groups makes the diagnosis certain.

Subacute examples of lower motor neurone disease are furnished by the various forms of *multiple peripheral neuritis*, although some indeed of these may be fulminating, as for instance *Landry's paralysis*. If this is not fatal within a few days, recovery in full may be expected. In this disease there is no affection of the sensory (afferent) paths, but in what is known as *acute toxic polyneuritis* there is as a rule some evidence of sensory impairment, varying from mild to severe loss of sensation, and often preceded by paræsthesia in the form of tingling and numbness. The etiology of these conditions, though not firmly established, is generally regarded as due to virus infection. Unless the patient dies, the ultimate prognosis regarding

complete recovery is good, a remark which also applies to the multiple neuritis of diphtheria. The cerebrospinal fluid in cases of acute toxic polyneuritis will often be found to contain a surprisingly high protein content (300 to 500 mgm per cent).

Examples of a chronic type of lower motor neurone disease are seen in *progressive muscular atrophy*, *bulbar palsy* and *amyotrophic lateral sclerosis*, in the latter type however, the upper motor neurone is involved as well.

Before leaving the motor system, brief mention must be made of the significance of involuntary movements. Chorea (Sydenham's and Huntingdon's), tremors, torsion spasm, tics, spasms and myoclonus come into this category.

Of *Sydenham's chorea* little need be said, but it is important to emphasize that paresis rather than involuntary movement may predominate, and this may have a hemiplegic distribution—circumstances which may at first cause a little difficulty. *Huntingdon's chorea* occurs in much older people, often with a family history, with speech defect and mental impairment.

Tremor occurs in a variety of pathological conditions. Intention tremor in cerebellar disease is not really a true tremor but is due to muscular incoordination. Lesions of the basal ganglion, particularly the corpus striatum, are likely to be followed by tremor, associated with an increase in muscular tone. The tremor of paralysis agitans may be taken as a type. There is possibly a striatal factor in senile tremor too, but widespread degenerative changes in the brain make exact localization difficult. Tremor as a manifestation of fear is well known, and is met with in anxiety states without focal anatomical basis.

Other examples of involuntary movements of striatal origin occur, but are rarely met with.

Tics must be differentiated from chorea. Occurring first as a rule in childhood, they are often continued into later life. They differ from chorea in that they consist of purposive, coordinated movements, which can be voluntarily inhibited for a time at any rate. They are movements which may be appropriate under certain circumstances, but which by repetition become inappropriate. They belong to the category of obsessional neurosis.

As opposed to the tics, are *spasms*. These are movements which result from irritation of the peripheral reflex arc, exemplified by the facial spasm often seen in *tic douloureux*. But facial spasm involving part or all of the supply of the seventh cranial nerve occurs apart from any painful accompaniment, sometimes due to irritation of the nerve in the petrous bone, but more often with no definitely ascertainable etiology. *Myoclonus* (short sharp muscular contractions—usually of individual muscle bundles) is most commonly seen in degenerative conditions of the lower motor neurone, e.g. progressive muscular atrophy, and is then known as fibrillation of muscle. Not all such cases have a pathological basis, an important fact to realize. Medical students who occasionally notice these fibrillary tremors in their own muscles, are inclined to take needlessly gloomy views of their prognostic significance. Rarely, widespread myoclonic contractions occur as a disease *sui generis*, and these sometimes are accompanied by epilepsy. Apart from these uncommon diseases, it is not unusual for epileptics to experience short uncontrollable muscular jerks apart from their fits, indeed these may precede the onset of the fully developed fit.

THE SENSORY SYSTEM

Sensory manifestations of disease are of two kinds—(a) subjective and (b) objective

(A) *SUBJECTIVE SENSORY SYMPTOMS*—These include a number of abnormal sensations, such as numbness, tingling, "pins and needles," pressure, thermal sensations and pains for which there is no obviously appropriate stimulus. Many of these are grouped under the term *paræsthesiæ* and sometimes *dysæsthesiæ*. They occur in a variety of disorders of the nervous system. Thus they are prominent early symptoms in many types of *peripheral neuritis* and in *subacute combined degeneration of the spinal cord*. In both cases the distribution of *paræsthesiæ* is usually symmetrical, peripheral and apt to include all four extremities. In *disseminated sclerosis* their distribution is more haphazard and their manifestations show a greater variety of abnormal sensation. Here their origin is central, i.e., in the spinal cord or brain, and not peripheral as in the former instances.

Arteriosclerosis of cerebral vessels not infrequently causes *paræsthesia*, often hemiplegic in distribution. Seemingly spontaneous pain is an important symptom. It may have peripheral or central origin, though the former is the commoner type. It is always wise to pay careful attention to the complaint of pain by a patient, even though such complaint may seem exaggerated. Pain from pressure on spinal posterior roots may be misleading. I have seen the appendix removed in one case, and a kidney explored in another, for what eventually proved to be an extramedullary spinal cord tumour.

I was much impressed by a case which came under my observation in the 1914-18 war. The patient, a healthy-looking youth, complained of pain in the right chest, about the nipple line. He was seen by the regimental medical officer and given medicine and duty. He complained thereafter so frequently and without apparent cause that he was threatened with various penalties. He persisted, however, and was sent home. Admitted to a hospital, a positive Wassermann reaction was returned in his blood. Although denying any risk of infection, he was put through a course of arsenical injections. I lost sight of him then until, about a year later, I came across him in a military hospital with a spastic paraplegia and sensory level up to the nipple. Laminectomy was performed, and a tumour about the size of a monkey-nut successfully removed. The patient made a complete recovery.

The pains which so often precede the more obvious signs of *tabes dorsalis* are well known, but not so often recognized as they should be. When accompanied by abdominal symptoms, they may simulate some surgical condition. Nowadays, surgeons are better educated in neurological possibilities than they used to be, but a good many years ago there were three patients in the National Hospital, one minus an appendix, another without a gall-bladder, and the third with a gastro-enterostomy—what they all had in common was *tabes dorsalis*.

The pains and discomforts which may occur in a hemiplegic distribution following a lesion in the region of the optic thalamus often prove most refractory. The pain which often precedes the development of the eruption in *herpes zoster* must be mentioned, as for a day or two it may cause difficulty.

(B) *OBJECTIVE SENSORY PHENOMENA*—During the examination of the nervous system, the different aspects of sensory function must be tested. Note must be made of the distribution of any loss of sensory perception which may be discovered, and of the particular aspects of sensation affected. It should not be difficult to decide whether these correspond to peripheral nerve, spinal root or

segment, spinal cord or cerebral distribution. Indeed the loss may not correspond to any known anatomical distribution at all, and it is then clear that the case must be an ideational, or in other words hysterical, sensory loss. The examiner, in testing the patient, must be careful to avoid any suggestion, as hysterical anaesthesia is easily manufactured, and also to make the examination under favourable conditions for the patient. Nor must the examination be too protracted, and the results must be confirmed by more than one sitting. It will usually be found that sensory findings are complementary to observations on motor and reflex functions, and thus help in accurate diagnosis. To take as an example a patient presenting atrophy of the intrinsic hand muscles, (a) without any sensory loss, (b) with loss of pain and thermal sensation in the arm, but not of tactile sensation, (c) with sensory loss to all forms of stimuli confined to the hand, (d) with loss of sensation along the ulnar side of forearm. Here the sensory findings will assist the following probable diagnoses—(a) progressive muscular atrophy or lead palsy, (b) syringomyelia, (c) lesion of median and ulnar nerves, (d) lesion of first thoracic posterior and anterior roots or lowest cord of brachial plexus—e.g., by cervical rib.

The distribution of posterior root areas is easily learnt and is of the utmost value. A final word with regard to testing sensation—Do not forget that the patient has a posterior aspect, as all the sacral root areas lie on the *back* of the leg, thigh and buttocks, and so may be overlooked.

REFLEXES

Space will not permit any detailed description of the significance of reflex activities. Loss of reflexes usually means an interruption of the spinal reflex arc—except immediately following cerebral or spinal shock, when they will in any case be absent—but a word must be said about bladder reflexes. These play an important rôle in nervous diseases, and on the efficient management of the bladder the patient's life may depend. Every gradation of disturbance of bladder function is met with, from precipitant micturition to incontinence on the one hand, dysuria to retention on the other. In disseminated sclerosis precipitant micturition is more common than dysuria, whilst in *tabes dorsalis* the converse is the rule. Pressure on the spinal cord at first causes dysuria and later goes on to retention, and the latter obtains following spinal or cerebral shock, as in cerebral vascular accidents. Many patients with slight bladder symptoms are seen first by surgeons and, if nothing is discovered in the course of urological examination to account for their difficulties, they are handed over to the physician. Sometimes an apparent cause turns out not to be the effective cause of trouble.

I remember some years ago being asked to see a patient by a surgical colleague. The man's business took him several times a year to South America. He complained that in hot weather he had difficulty in passing his water and in cold weather in holding it. The surgeon had removed the man's prostate, but when his abdominal wound should have healed it broke down. I found that the patient had extensor plantar reflexes and positive Wassermann reaction in blood and spinal fluid. His symptoms were due to neurosyphilis.

May I, in conclusion, recommend the study of the physiology and anatomy of the nervous system—so apt to get rusty with the lapse of time—to all those interested in this aspect of medicine?

NOTES AND QUERIES

THE EFFECT OF CHEWING-GUM ON THE TEETH

QUESTION—I should like to get some authoritative opinion about chewing-gum. I suppose it is one of the effects of having so many Americans over here, but a lot of my children's patients now have adopted this form of sweet-tooth. Is it good or bad for the teeth? Or perhaps the question might be put the other way round—are the good teeth seen frequently amongst our American visitors in any way due to the use of chewing-gum?

REPLY—The effect of chewing-gum is cleansing, but this beneficial result is almost entirely limited to the teeth used and would have little effect on the front teeth. The salivation induced would help to clean all the teeth. The sugar would be quickly washed away and would do no harm. Excessive chewing on particular teeth might wear away the cusps and upset the bite. Americans are not usually credited with good teeth. Possibly many of those with good teeth at present in this country, come from rural districts where diet is more "natural" than in the towns.

SIR NORMAN BENNETT, M.B.,
M.R.C.S., L.D.S.

PSORIASIS

QUESTION—Can some expert enlighten me further on the treatment of psoriasis. I have failed to cure a severe case in which the arms and legs are affected. Perhaps I am using the wrong dosage or the wrong hormonal extract. I used syncortyl 5 mgm daily; vitamin B complex, 4 capsules daily; vitamin C, anterior pituitary growth hormone $\frac{1}{2}$ c.cm twice weekly; and eliminated fat from the diet. What specific preparations should I use and what dosage?

REPLY (from a dermatologist)—Dermatologists are in agreement that the cause of psoriasis is unknown, and therefore it may be argued that hormonal dysfunction and vitamin deficiency cannot be excluded as possible etiological factors. The investigations of Dodds, MacCormac and Robertson have shown that neither a high nor a low fat diet has any effect whatsoever on the eruption. Treatment, it is usually considered, relies on external applications, such as salicylic acid ointment in the more acute phases, and one of the recognized textbook ointments for an established eruption. The importance of a thorough application is perhaps not always recognized by patients, who are unwilling to

spend one hour or more daily on their treatment. Some patients respond well to ultra-violet radiation, a clean and simple procedure.

INTRACTABLE SEXUAL FRIGIDITY

QUESTION (from a subscriber in Lancashire)—I have been asked to treat a woman, age thirty-three, who has been married for ten years and, although she has a child seven years old, has always suffered from sexual frigidity. Five grain doses of stilbœstrol have been taken for some days after each menstrual period and she has also used suppositories containing 10,000 I.U. of œstrone daily and an ointment (neo-hombreol) applied locally for clitoral stimulation—all without any effect. The patient's sister is similarly affected. Could you offer any further suggestions as to treatment?

REPLY—Frigidity does occasionally respond to hormone therapy and the treatment with stilbœstrol and the neo-hombreol ointment is much to be commended. Failure to respond to this, I think, points to a psychological cause, which is frequent in many of these patients.

DOUGLAS MACLEOD, M.S., F.R.C.P.,
F.R.C.S., F.R.C.O.G.

RINGWORM OF ANIMAL ORIGIN

A READER in Wales writes—Some years ago a question from me on calf ringworm was printed, and Dr J. Ingram gave a valuable remedy—

R Brilliant green	$\frac{1}{4}$ per cent.
Mercuric chloride	$\frac{1}{4}$ per cent.
Industrial spirit	99 per cent.
Ft. paint.	

Ringworm caught from cattle is a daily event in this part of Wales. Horses get it, but I have not seen it in sheep, dogs or cats. The lesion is nearly always in front of the wrist, and is often raised with pus present. It must be treated like scabies, i.e., every scrap of clothing and bedding must be disinfected. Sometimes non-farmers become infected. A few days ago I saw a man who had carried an infected trough on his lorry; he had ringworm on the wrist. All farm buildings, posts, rails and gates, where cattle rub, are infected and should be lime washed and the cattle treated. It is no easy matter to clean infected buildings, they must first be sprayed over. Patients often treat themselves with tincture of iodine, or ink, the only thing to do then is to apply zinc ointment.

PRACTICAL NOTES

HEAT IN THE TREATMENT OF SHOCK

THE use of heat in the treatment of traumatic shock, for the relief of cutaneous vasoconstriction, is a generally accepted procedure at the present time. That it may, however, have an adverse effect is indicated by the results obtained by A. W. Kay (*British Medical Journal*, January 8, 1944, I, 40) in an investigation carried out in a series of fifteen young adult male patients convalescing from minor surgical operations or awaiting the same. Heat was applied by means of the hot-air cradle, the temperature used varying between 38° and 40° C. Observations concerning the arterial blood pressure, the venous blood pressure, pulse rate, oral temperature and the patient's general condition were made before applying the heat, at ten minute intervals during the application and for forty minutes afterwards. In order to bring the investigation into line with the treatment of shock, normal saline was given by the intravenous route in ten cases, the dosage varying between 200 and 1,000 c.cm. Intravenous plasma, in amounts ranging from 250 to 700 c.cm. was administered in the five other cases. In addition to a constant fall in arterial blood pressure, rise in venous blood pressure, increased pulse rate and rise in oral temperature, marked effects on the patients' general condition were noted, these symptoms being so severe in three cases that the experiment had to be abandoned. In every case flushing was present before the termination of heat application, and frontal headache was common, the headache often persisting for twelve to twenty-four hours after the application. Dehydration was present in nine cases, nausea in six, followed in two instances by vomiting. Sweating was noted in all cases, and abdominal discomfort, muscular pains and exhaustion were also present. In view of these findings, particularly as regards the flushing, the fall in arterial blood pressure and the dehydration, the author suggests that prolonged application of heat in cases of traumatic shock may prove harmful rather than beneficial.

TREATMENT OF ESSENTIAL DYSMENORRHOEA WITH ETHINYL OESTRADIOL

THE results obtained in a series of twelve patients with essential dysmenorrhoea treated by oral administration of ethinyl oestradiol, a synthetic oestrogen of high potency, are recorded by R. A. Lyon (*Surgery, Gynecology and Obstetrics*, December, 1943, 77, 657). The ages of the patients ranged from nineteen to thirty-five, and in no case was an additional

gynaecological disorder present. Ethinyl oestradiol was given orally in dosage of 0.05 mg. once daily, beginning at least twenty-one days before the menstrual period and continuing for twenty-four days. The general plan of treatment was oestrogen for two successive cycles, and the one menstrual period without treatment. Some alteration in the length of the cycles was noted during oestrogen treatment, i.e. the duration of bleeding was 1-8 days longer and the flow was less profuse. In consequence the succeeding cycles, particularly when untreated, were usually shortened to 25 or 26 days. Forty-four cycles were treated, in six there was no bleeding and either an additional 24 tablets of ethinyl oestradiol were administered after a free interval of one week or a normal menstrual period without treatment was allowed. In the latter event dysmenorrhoeic cramps invariably occurred. Toxic reactions in the treated series were nil and the treatment was well tolerated and liked by the patients. As the basic principle of the treatment is the temporary suppression of ovulation the importance of instituting treatment at least three weeks before the menstrual period should not be overlooked. None of the patients treated failed to ovulate when the treatment was withheld. Prolonged ovarian rest or suppression of the follicle-stimulating hormone has been shown generally to be undesirable; the method therefore is advocated not as a cure but as providing a temporary relief in intractable cases of dysmenorrhoea, and, also, as these patients usually show immature development of personality, the method was found to inspire the necessary confidence which is frequently lacking. The patients in the reported series were under observation for from six to fifteen months. In view of the potency of ethinyl oestradiol results can be obtained with low dosage. The method of two treated cycles and one untreated is advocated in order to preclude persistent oestrinism.

SWIMMING-BATH CONJUNCTIVITIS

SWIMMING-BATH conjunctivitis, or inclusion blenorrhoea or conjunctivitis, is a virus disease due to contamination of the water. Inclusion blenorrhoea also occurs in the newborn through infection at birth from the genital canal of the mother. Inclusion bodies have been found in the urethral epithelium of males with urethritis, and the proposition is put forward by E. H. Derrick (*Medical Journal of Australia*, October 23, 1943, 30, 334) that contamination of swimming-bath water may be due in some instances to this cause. The symptoms are slow

in onset, usually appearing after an incubation period of three to four, or in some instances seven, days, starting with a mild hyperæmia followed by slight swelling of the lids, a painless swelling of the pre-auricular gland, photophobia and considerable irritation. The conjunctiva becomes swollen and on the seventh to tenth day follicles appear. The onset is usually unilateral, the second eye becoming infected in two to three weeks time. Inflammatory symptoms appear in from three to four weeks but for two months the mucous membrane remains thickened and hyperæmic, and four to six months after the condition resembles folliculosis, the follicles disappear slowly. The conjunctivitis has been reported to respond well to treatment with sulphonamides, and in infants the use of a 5 per cent sulphathiazole or sulphathiazole sodium ointment, applied six times daily, has been found effective. Three cases in boys, in whom the condition showed itself six and seven days after spending several hours together in a swimming-bath, are recorded by the author. In two only one eye was affected, in the third case the second eye became infected two days later. There was considerable rise in temperature on the second day of the illness—in two cases to 102° and 102.4° for four days—and then a rapid fall by lysis. The eyes were first treated with 10 per cent solution of argyrol and later with merthiolate solution (1/1,000) and merthiolate ointment. In the third case the condition was treated with boracic lotion and ran a similar course. The author therefore expresses the view that the treatment had little effect on the course of the conjunctivitis. In each case examination four months after the illness showed the presence of a mild folliculosis.

DIAGNOSIS IN INTESTINAL OBSTRUCTION

IN a review of one hundred and eleven cases of intestinal obstruction seen at the St. Vincent's Hospital during a five year period, F. J. Morris (*Irish Journal of Medical Science*, December 1943, 216, 615) discusses the difficulties of differential diagnosis. The general symptoms are pain, constipation, vomiting and abdominal distension. The severity of the pain, however, may vary greatly. With strangulation, especially if the onset is sudden, the pain is severe and accompanied by collapse. When acute obstruction supervenes on chronic stenosis the pain may not be severe; on the other hand in many of these cases of sudden obstruction the patient may complain of intense pain although there are no signs of collapse and the pulse and temperature are undisturbed. In such cases malinger- ing or neurosis is often suspected, but delay in exploratory operation may have serious results. The pain of carcinoma of the distal colon is

usually in the right iliac fossa and suggests appendicitis. Another diagnostic point to be borne in mind is the difference between the symptoms of intussusception in children and adults, in the adult the symptoms are not so acute and the intussusception may exist for a considerable time before coming to operation. Constipation may be severe and yet obstruction not be present, and conversely, when obstruction is present the patient may not complain of constipation, in cases of intussusception diarrhoea is usually mentioned. Vomiting indicates obstruction of the small bowel, it may not occur with large bowel obstruction, and if it does is not feculent. Abdominal distension is exceedingly difficult to diagnose in the early stage, and a warning is given against waiting until visible peristalsis appears. The most valuable aid to diagnosis is the stethoscope, as attacks of abdominal colic are associated with a noisy turbulence which is unmistakable evidence of a blockage, in fact, the author states that the progress of a case may be estimated by auscultation alone. The X-ray picture of intestinal obstruction is easily read, although it does not show the cause of the obstruction:—Air is normally present in the stomach and large bowel and is apparent on the skiagram. The contents of the small bowel are not visible, but when obstruction is present air is visible within three hours of onset and the retained contents produce a series of crescentic shadows, the loop above the stenosis assumes the position of an inverted U. In large bowel obstruction, when evacuation of the lower bowel is procured by enemas, the empty distal bowel is seen in contrast to the air-filled loops proximal to the stenosis. If on first examination the accumulation of gas in the small intestine does not justify diagnosis, a second examination should be made in three hours. When strangulation is present the symptoms are usually severe, i.e., shock, fall of blood pressure or cardiac irregularity, and local signs in the form of tenderness and "rebound" tenderness on palpation.

THE USE OF LOW-DOSAGE IRRADIATION IN THE TREATMENT OF AMENORRHOEA

A FURTHER report of the successful use of low-dosage irradiation of the pituitary gland and ovaries in a series of ninety-two cases of amenorrhoea, the possibility of pregnancy first being eliminated by biological test unless the patient had recently menstruated, is given by C. Mazer and Rose Greenberg (*American Journal of Obstetrics and Gynecology*, November 1943, 46, 648). Only patients who were physically well and who were proved not to be suffering from hypo- or hyperthyroidism or from pituitary adenomas were included in the

series The ages of the patients ranged from seventeen to thirty-six, girls under the age of seventeen and women over the age of thirty-nine were excluded in view of the facts of the immaturity of the ovaries in the first category and the phase of natural decline in the second In accordance with the size of the pelvis and the thickness of the abdominal wall a dose of 50 to 90 r measured in air was given and repeated three times at intervals of one week The pituitary gland was treated at the same time through a field of 5 by 5 cm just above and posterior to the midpoint of a line joining the outer canthus of the eye and the external auditory meatus Ten of the patients treated had not menstruated for a period of sixteen months to six years (average two years and eight months) Five of these patients, including one with total amenorrhoea for six years, menstruated following treatment during a follow-up period of one to five years, average three years Eight of twelve patients who had only menstruated at intervals of six months menstruated normally over a follow-up period averaging two-and-a-half years Fifty-two of sixty-eight patients with oligomenorrhoea, who before treatment menstruated at intervals of from two to four months, menstruated normally during a follow-up period of two years and seven months average for the entire group In fifty-four patients sterility was an important factor; thirty conceived at varying intervals after termination of treatment, twenty-eight being delivered at term of healthy infants, two aborted during the first three months of pregnancy All these women menstruated normally after the termination of pregnancy Endocrine dysfunctions were treated when necessary in conjunction with the irradiation therapy, and seventeen women with a history of prolonged uterine bleeding after variable periods of amenorrhoea were given injections of chorionic gonadotrophin, 500 I U daily for as long as the bleeding persisted, followed by subsequent low-dosage irradiation Control of the bleeding was accomplished in twelve cases but in only six of the seventeen was normal menstrual rhythm restored No spontaneous anovulatory cycles were observed in the treated series

AGRANULOCYTOSIS TREATED WITH SULPHADIAZINE

THREE cases of agranulocytosis due to sulphadiazine therapy in which treatment of the condition with large doses of the drug resulted in complete recovery are recorded by N Nixon, J F Eekert and K. B Holmes (*American Journal of the Medical Sciences*, December, 1943, 206, 713) The patients were aviation cadets aged twenty-two to twenty-six years One was

suffering from scarlet fever and two from virus pneumonia In two of the cases the patients were critically ill and not expected to recover when the sulphadiazine administration was reinstituted In one case, a cadet with scarlet fever, improvement had occurred after a first administration of sulphadiazine of 58 gm although the white blood count was still 1,470 Three days later the patient, who had been receiving liver extract and pentavite, ascorbic acid and transfusions, became critically ill and was not expected to survive Sodium sulphadiazine was given intravenously in dosage sufficient to maintain the blood level at 20 to 25 mgm per 100 ccm After three days jaundice appeared and sulphadiazine was discontinued for one day and then resumed in dosage sufficient to maintain the blood level at 5 to 10 mgm per 100 ccm The next day the white blood count, which had ranged between 200 and 310, rose to 1,470, and immature granulocytes were present Four days later evidence of blood dyscrasia had disappeared The patient made a good recovery In each of the cases of virus pneumonia the patient had improved after a total administration of 76 gm sulphadiazine Three days later there was a severe relapse with sudden drop in white blood count and abrupt rise of temperature The drug was resumed in dosage sufficient to maintain the blood level at 5 to 10 mgm per 100 ccm and continued for eight days A new consolidation of the lung had developed and the drug was stopped for two days The condition became worse and the patient comatose and deeply cyanotic, with auricular fibrillation and respiratory embarrassment due to congestive cardiac failure Some relief was obtained by respiration digitalization and oxygen, and sulphadiazine was resumed in dosage of 10 gm daily The next day there were signs of improvement, and six days later the white blood count, which during the period before the severe relapse had ranged from 130 to 1,050, rose to 14,150 During this third period of treatment a total of 150 gm sulphadiazine was given, the total for the whole period of illness was 290 gm In a fourth case recorded in a footnote, in which a patient with moderately severe scarlet fever developed a complete agranulocytosis after receiving 52 gm sulphadiazine in twelve days, the intention of resumption of sulphadiazine therapy was not resorted to and the white blood count recovered normally It is stated that only when severe infection is imminent should this sulphadiazine treatment be given Although in the recorded cases sulphadiazine was the drug responsible for the development of the agranulocytosis its use for the subsequent treatment of the condition is recommended, as of all the sulphonamides it is the least apt to cause toxic reactions.

REVIEWS OF BOOKS

he Surgery of Repair Injuries and Burns
By Squad-Ldr D N MATTHEWS,R.A.F.V.R., M.D., M.Ch., F.R.C.S. Oxford
Blackwell Scientific Publications Ltd,
1943 Pp 386 Figures 198 Price 45s

HIS book falls naturally into four parts: the first deals with the immediate treatment of most soft tissues and of skeletal injuries of the face, although a section on perforating wounds of the chest and abdomen is included. The broad principles of the technique of treatment of wounds and skin losses is well stated. Perhaps the use of chemotherapy in clean wounds is advocated with more persistence than is justified. Parts two and three are concerned with the many aspects of subsequent repair. This is an enormous and a very difficult subject and its compression into 230 odd pages may account for the didacticism with which it is presented. Almost every plastic procedure is conditioned by so many factors, both local and general, that few dogmatic statements are acceptable. Part four is an up-to-date summary of the vexed question of burns. A full and unbiased statement of the present state of knowledge of both the pathology and the various methods of treatment available is perhaps one of the most valuable parts of the book.

A Handbook on Difficult Labour By M. L. TRESTON, F.R.C.S., F.R.C.O.G. Simla.

Liddell's Printing Works, 1943 Pp 135

Illustrations 55 Price Rs 5

THE first edition of this little book on difficult labour never appeared, owing to the fact that all copies, blocks and type were destroyed by enemy action. In spite of this unfortunate beginning, the author has brought out the second edition in which some alterations have been made and two new chapters added. The main interest of the book lies in that it gives a good account of the author's experience in obstetrics in India, also the difficulties with which an obstetrician is faced in that country, and which he does not meet in England. The worth of the book must be considered in this light and it makes interesting and valuable reading. It cannot be considered in the light of a textbook for teaching purposes. For example, in discussing the treatment of placenta prævia, he mentions Caesarean section, and adds that "this last procedure is in my opinion the best, but it is rarely possible or practicable"—fortunately a state of affairs which seldom arises in this

country. The author gives an interesting list of statistics, and expresses the hope that this small book may be found useful in practice.

Sting-Fish and Seafarer By H. MUIR EVANS London: Faber and Faber Ltd.,

1943 Pp 180 Figures 31 Price 15s

THIS is a remarkable book not only for its intriguing title, but for its generous supply of line drawings, valuable as a source of information and leaving in the reader's mind the impression of an obvious want supplied. The author was for forty years surgeon to the Lowestoft Hospital, and he uses his well-trained powers of observation for the study of an unusual and interesting subject. The intrinsic merits of the text are outstanding, and the reader is told of the beginning of the scientific study when the author was working in the pathological laboratory in the medical school of University College Hospital. In the present book reference is made to the widespread visits abroad in order to study the conditions of the weavers on the Continent, the Italian Riviera, Madeira, Madagascar and Mauritius. Among the twenty-four chapters interest attaches to those dealing with weavers and other sting-fish, in which an histological illustration of the "gland," showing the changes due to blood conditions caused by inoculation of weaver venoms, is included. Chapter IV deals with the spurdog or spiny spur. Other interesting chapters are those devoted to sponge-diver's disease and the treatment of wounds caused by venomous fish.

NEW EDITION

Surgery of Modern Warfare, Part III, edited by HAMILTON BAILEY, F.R.C.S., in its third edition (E. & S. Livingstone, 15s) is divided into three sections dealing respectively with wounds of the blood vessels, methods of immobilizing the limbs, and amputations. In the first section chapters dealing with the application of tourniquets, the use of the anticoagulant heparin, and arterio-venous aneurysms following gunshot wounds should prove of considerable interest. In the second section an attractive feature is the chapter on plaster technique, and in the third section much topical interest will attach to the illustrated discussion of the method of knee-plastic amputation and its value for the development of compensatory efficiency in the use of a prosthesis after amputation. The new edition is richly illustrated and will doubtless prove a popular number of the series.

NOTES AND PREPARATIONS

NEW AMPOULE SYRINGE

THE 'MONJECT' BRAND AMPOULE SYRINGE has been devised for the use of the Forces in the field. It consists of a sealed collapsible tube with welded closure to which a hypodermic needle is attached, mounted in the nozzle. Sterility is ensured by a plastic cap sealed on to the nozzle of the tube. At present supply is limited to the Forces, but later it is hoped the syringe will be available for emergency civilian use. The manufacturers are Burroughs Wellcome & Co., 183-189 Euston Road, London, N W 1.

VITAMINS

A SECOND edition of *The Vitamins: A General Survey for the Practising Pharmacist*, has been published by the Pharmaceutical Society of Great Britain. Although designated for the pharmacist the information contained in this little book is of definite importance to the practitioner. The booklet is obtainable from the Pharmaceutical Press, 17 Bloomsbury Square, London, W C 1, price 2s 6d.

MENTAL DEFICIENCY AND ALLIED CONDITIONS

A COURSE of lectures on the above subject, arranged by the University Extension and Tutorial Classes Council in cooperation with the Provisional National Council for Mental Health, will, provided sufficient applications are received, be given at the London School of Hygiene and Tropical Medicine, Keppel Street, Bloomsbury, W C 1, from April 24th to May 5th 1944. Full particulars can be obtained from Miss Evelyn Fox, C B E, c/o University Extension Department, University of London, 39 Queen Anne Street, London, W 1.

MINISTRY OF HEALTH CAMPAIGN

WITH the object of increasing the campaign against spread of disease, the Ministry of Health have decided to issue a quarterly bulletin to pharmacists, the bulletin to be published as a four-page supplement to the *Pharmaceutical Journal*. The first bulletin, which comprises a foreword by Sir Wilson Jameson, K C B, M D, F R C P, Chief Medical Officer of the Ministry of Health, and articles dealing with venereal disease, droplet infection and measures for prevention, appeared in the issue of January 1st, 1944 (*Pharmaceutical Journal*, 152, 7). In view of the numbers of people who seek advice at chemist's shops this new venture should considerably increase the scope and usefulness of the campaign.

OFFICIAL NOTICES

The Organization of a Hospital Rehabilitation Department (Emergency Medical Services Memorandum, no. 6) deals with the general scope of rehabilitation facilities in F M S hospitals and also gives particulars of courses for members of the staff. Copies can be obtained from H M Stationery Office, price 2d. *The Liver Extract (Regulation of Use) Order, 1944*, limits the use of liver extract, including desiccated liver, to the treatment of pernicious or other megalocytic anemias. The only forms of liver extract which may be used for these purposes are injectable liver extract and proteolysed liver extract. The Ministry of Health's issue on the subject is obtainable from H M Stationery Office, price 1d. *National War Formulary and Drug Index*, issued by the Ministry of Health, relates to the renewed availability of tincture of belladonna for dispensing preparations in the second edition of the National War Formulary, and also to the extension to August 1, 1944 of the period during which alternative formulae for the ointments in the B P Addendum VI may be used.

CONTENTS FOR APRIL, 1944

INDIGESTION

- General Introduction Indigestion and Nausea*
Health By Sir Arthur Hurst, D M, F R C P
Peptic Ulcer By Sir Henry Tidy, K B E, M D, F R C P
Surgical Dyspepsia By R. Davies Colley, C M G, M Ch, F R C S
Indigestion and the Teeth By C. Bowdler Henry, M R C S, L D S
Indigestion during Pregnancy By F. Neal Reynolds, F R C S, F R C O G
Indigestion in Infancy By F. M. B. Allen, M D, F R C P
Indigestion in Older Children By C. Paget Lapage, M D, F R C P
Gastroscopy By A. Morton Gill, M D, M R C P
Gastritis By Maurice Shaw, D M, F R C P
The Early Diagnosis of Carcinoma of the Stomach By E. C. Warner, M D, F R C P
Psychological Aspects of Indigestion By Aubrey Lewis, M D, F R C P
Indigestion in Diseases of the Nervous System
 By A. W. Hendry, O B E, M D, F R C P
-
- The Interpretation of Physical Signs IV—The Abdominal Disorders* By C. E. Lakin, M D, F R C P, F R C S

INDIGESTION AND NATIONAL HEALTH

By SIR ARTHUR HURST, D M, F R C P

Consulting Physician, Guy's Hospital, and Physician (temporary), Radcliffe Infirmary, Oxford

THE constant anxiety of the years between the two great wars, which led to the steady rise in the incidence of gastric disorders, can be fully realized only by those whose memories go back to the care-free days before 1914. National and personal security should lead to a corresponding fall in the incidence of inflammation, ulcer and cancer of the stomach. Freedom from anxiety will also do much to reduce the incidence of alcohol and smoking. Freedom from want will lead to the provision of better food, and widespread education of young women in domestic science should lead to better cooking. Improved conditions of labour will prevent overworking of meals. Together with the provision of adequate holidays it will also prevent their consumption when digestion is inadequate as a result of fatigue.

GASTRITIS, GASTRIC ULCER AND GASTRIC CARCINOMA

Carcinoma never develops in a normal stomach. It is invariably caused by malignant degeneration of a chronic ulcer or of the unhealthy mucosa in chronic gastritis. Both chronic ulcer and chronic gastritis are the result of long-continued irritation of the mucous membrane in people with a constitutional tendency to develop gastric disorders. One type of gastric inferiority predisposes to ulceration, a second type to gastritis. In the former, acidity is high or normal, in the latter it is low or absent. The irritation may be mechanical or chemical. The chief mechanical irritants are food which has been insufficiently chewed as the result of hurrying over meals, deficient teeth or badly fitting dentures, and food which is coarse or badly cooked. The chief chemical irritants are condiments, alcohol taken on an empty stomach, and swallowed tobacco juice.

The effect of mechanical and chemical irritants is greatly aggravated by anxiety and fatigue.

The recent investigations of Wolf and Wolff on "Tom," the modern Alexis St. Martin, whose gastric fistula they observed in varying emotional states, have demonstrated that anxiety leads to increased secretory and motor activity associated with congestion of the mucous membrane. The engorgement may be so intense that the appearance is indistinguishable from what gastroscopists have hitherto diagnosed as hypertrophic gastritis, which is in fact a rare condition, though frequently simulated by the congestion caused by the anxiety associated with the examination. Wolf and Wolff further discovered that the congested mucosa was much more vulnerable to slight mechanical and chemical irritation than the comparatively thin and pale mucosa seen when Tom was happy and contented.

It is clear that carcinoma of the stomach should be a preventable disease. If there were no gastric ulcer and no gastritis there would be no carcinoma. The ulcer diathesis and the gastritis diathesis are constitutional and cannot be prevented or overcome. But if the exciting causes, mechanical and chemical irritation, and the predisposing causes, anxiety and fatigue, are avoided, no ulcer and no gastritis will develop.

A dentist is needed for every two thousand inhabitants of this country in order to keep their teeth in good condition, provided that each dentist has dental hygienist to assist him. This means that the number of dentists—men women—must be increased to 23,000, and 23,000 girls must be trained as hygienists, whose duty it will be to scale the teeth and instruct both adults and children in oral hygiene. This will leave the fully qualified dental surgeon, who superintends their work, sufficient time to treat teeth conservatively instead of performing wholesale extractions. There is no reason why, with adequate dental and adequate dental attention for people of all ages and not only the young, the teeth should not be preserved to old age. The incidence of carcinoma of the stomach in the poor would then no longer be double that in the well-to-do, although the total incidence of cancer is the same in all classes. Their stomachs are alike at birth. It is therefore an extrinsic cause which leads to the high incidence of cancer in the poor, and the only extrinsic cause which is present much more frequently in the poor than in the well-to-do is the deficient mastication which results from insufficient teeth, badly fitting or deficient dentures and, among the very poor often no dentures at all.

There is thus a unity in the causes and in the prophylaxis of organic gastric disorders. Social security resulting from freedom from anxiety and freedom from want and improved education should lead to their gradual elimination. No greater contribution could be made than this to the cause of national health.

GASTRIC AND DUODENAL ULCER

More patients are admitted into British hospitals at the present time for gastric and duodenal ulcer than for any other condition. A considerable proportion have been previously treated in hospital for the same condition once, twice, or still more frequently. There are two reasons for this unsatisfactory state of affairs: a large proportion of patients with ulcer are discharged from hospital long before healing has occurred, and the instructions given to them concerning the precautions they must take in order to prevent a recurrence are totally inadequate. Symptoms generally disappear so rapidly with rest in bed and simple dieting that it is too often assumed that the ulcer has healed in two or three weeks, and no steps are taken to ascertain whether this is in fact true. The shortage of hospital beds and the little medical interest of cases of ulcer under treatment prompt house-officers to get rid of them at the earliest possible moment. The result is that soon after the patient returns to the conditions under which his ulcer originally developed, it becomes active again. If, in contrast with this, he is kept on the strictest treatment until all the evidence points to complete healing, a new ulcer is much less likely to develop.

The high incidence of gastric and duodenal ulcer will not be materially reduced

until every town hospital is provided with a country annexe for the treatment of chronic diseases. A patient with ulcer will then be taken into the central hospital for diagnosis and the first fortnight of strict treatment, after which he will be transferred to the country to continue the treatment in bed for as many weeks as are likely to be necessary for healing to occur. At the end of this period he will return to the central hospital for re-examination, and will then be sent for a final period to the country for more strict treatment if healing is still incomplete, the treatment in any case ending with a fortnight's rehabilitation, during which he gradually returns to activity and learns the post-ulcer regime.

The strict treatment should consist in mental and physical rest with frequent non-irritating feeds, together with such alkalis as magnesium trisilicate and aluminium oxide, and atropine in maximal doses when the acidity is high or pain persistent. This should be continued until all spontaneous pain has disappeared, there is no tenderness or rigidity, no occult blood in the stools, and the X-rays show no trace of an ulcer crater, and in no case for less than four weeks. Often six or eight weeks are needed to secure complete healing, and for large gastric ulcers still longer. In the case of gastric ulcers a gastroscopic examination should be made about a fortnight after the last trace of the "niche" seen with the X-rays has disappeared, as experience shows that at least this time must elapse before a sound scar has replaced the granulations filling the niche.

Reference has already been made to the gastric diathesis which predisposes to gastric ulcer. A quite different type of stomach, the characteristic features of which are hyperchlorhydria and rapid evacuation, predisposes to duodenal ulcer. It is futile to give a patient with an ulcer a period of strict treatment if steps are not taken to prevent its recurrence on returning to work after it has healed by giving him a regime which he must follow for the rest of his life. It should be explained to him that his recent illness is the result of a constitutional tendency, and that a recurrence is almost certain to occur if he returns to the conditions of life which preceded its onset. However long he remains free from symptoms he must keep to the new regime, as he will never outgrow the constitutional tendency, which is as much a part of him as his external appearance. I tell such patients that if they ever have a recurrence it will certainly be either their fault or mine—theirs if they have not kept to the rules, mine if they have. If it is my fault, I shall have to give them a better planned regime, but I can tell them beforehand that the chances are at least ten to one that it will prove to be their fault, not mine.

I have drawn up a post-ulcer regime, which has been revised from time to time during the last twenty-five years, and especially recently in order to fit in with war-time conditions. It differs materially from most regimes, which are given to patients leaving hospital after a period of strict treatment for ulcer or after operations for ulcer, as comparatively little attention is paid to details about what they may and may not eat compared with how and when they should eat, and attention is drawn to other important factors, such as fatigue, anxiety, infections and tobacco. It is of course essential to discuss the regime in detail with each individual patient and modify it, when necessary, in the light of his own past experience as to the factors which have preceded the onset of his attacks of active ulceration. It is also important to remember that whereas extrinsic factors are of special importance in

gastric ulcer, psychological factors are generally of chief importance in duodenal and anastomotic ulcers. In hospital the regime should be explained by the physician or his house-officer, and not by the dietitian, whose interest is likely to be concentrated on the relatively unimportant details of diet. It is also much better to tell a patient what he should avoid rather than to give him standard meals, which are often quite impossible for him to obtain.

It is quite easy to arrange for the two-hourly feeds in almost every civilian occupation, with the help of the two pints of milk allowed to "ulcer patients" and the occasional addition of their sweet ration in the form of plain chocolate and biscuits when obtainable. A lorry driver, farm labourer or clerk can take the milk with him in a bottle and have a drink as often as necessary, so that it does not matter if, in the case of the lorry driver, for example, dinner is taken at irregular hours and long periods elapse between proper meals.

The note about drugs in tablet form is of special importance if a patient has had a hæmorrhage, as aspirin is much the most common cause of hæmatemesis in the absence of other gastric symptoms. It is also occasionally the cause of hæmorrhage in patients with a chronic ulcer.

POST-ULCER REGIME

TO BE FOLLOWED PERMANENTLY

- (1) A meal or feed (milk, plain biscuit or plain chocolate) should be taken at intervals of not more than two hours from waking to retiring, and again whenever you wake during the night.
- (2) Eat slowly and chew very thoroughly. Adequate time should be allowed for meals, which must be punctual. Avoid taking a meal when you are tired, first rest for at least a quarter of an hour. When there is no time for a proper meal, it is better to drink some milk or eat some plain chocolate or biscuits than to bolt some less digestible solid food.
- (3) Do not smoke more than six cigarettes or two pipes a day, and these should be after meals. Cigarettes should have an absorbent plug in the mouthpiece. Do not smoke at all if you have any indigestion.
- (4) During periods of overwork, and especially of mental stress, whenever possible one day or half-day a week should be spent resting in bed or on a couch, or lying out of doors, on a strict hourly or two-hourly diet, even in the complete absence of digestive symptoms. If you are much worried or sleeping badly, ask your doctor for a sedative.
- (5) Special care should be taken to avoid chills. If you get a cold, sore throat, influenza or other infection, remain in bed on a very light diet until you have completely recovered.
- (6) Avoid alcohol, except (if desired) a small quantity of beer, light wine or diluted whisky with (but never before) meals. Avoid pips and skins of fruit (raw, cooked or in jam, and raisins, currants, figs, ginger and lemon-peel in puddings and cakes), nuts and unripe fruit. Avoid radishes and raw celery, tomato skins, stringy French beans, hard peas and beans. Coarse green vegetables (cabbage, etc.) must be passed through a fine sieve.
Avoid porridge made with coarse oatmeal, wholemeal and similar biscuits, tough meat, mustard, pepper, vinegar, curry, pickles and chutney.
If in doubt about any food, remember you must not eat anything which cannot be chewed into a mush.
- (7) A teaspoonful of magnesium trisilicate or aludrox should be taken an hour after meals and also whenever the slightest indigestion or heartburn is felt.
- (8) Isogel or liquid paraffin may be taken for the bowels, if necessary, but no other aperient should be used.
- (9) Visit your dentist regularly every six months.
- (10) Take no drugs, such as aspirin, in tablet form.
- (11) If you have the slightest return of symptoms, go to bed on a strict diet at once. Consult your doctor and do not wait for the symptoms to get serious.

PEPTIC ULCER

By SIR HENRY TIDY, KBE, DM, FRCP

*Extra Physician to H M the King, Consulting Physician, St Thomas's Hospital,
Royal Northern Hospital and Millbank Hospital*

PEPTIC ulcer came into prominence as a serious practical problem in the second half of the nineteenth century. Attention became directed to the frequency of acute gastric ulcer, associated with perforation or hæmorrhage, in girls and young women under the age of thirty-five years. The catastrophe might or might not be preceded by a comparatively short period of pain after food. Either a catastrophe occurred or the ulcer healed: it did not linger on into later life as a chronic ulcer. This type of acute ulcer probably began to be prevalent between 1820 and 1840, and for several decades the number of deaths resulting exceeded those from all other groups of peptic ulcer. By 1900 the incidence was diminishing rapidly and shortly afterwards two other groups of peptic ulcer came into view. Chronic gastric ulcer became more frequent and affected both sexes and all ages, but usually males, and especially in the later decades of life.

An even more spectacular event was the arrival of duodenal ulcer. It was noted from the first that it occurred predominantly in males. The diagnosis was based almost solely on the observation of melæna associated with some form of upper abdominal pain. Moynihan then began his battle for the earlier and more general recognition of duodenal ulcer and described the clinical manifestations in addition to those of melæna and hæmatemesis. It is often thought that Moynihan distinguished an entity which had been previously overlooked. This is not quite correct. Moynihan's campaign coincided with the rise of duodenal ulcer from a rare to an everyday occurrence.

No increase in the incidence of peptic ulcer was observed during the war of 1914-18, either among civilians or in the Services. Medical officers in France specifically noted its rarity. There is no reference to peptic ulcer in the text of the *Medical History of the War*, and the title of duodenal ulcer does not appear in the tables of statistics.

There is no doubt that the incidence of peptic ulcer increased enormously between the two wars, especially in males. Little attention was paid to it; an occasional article appeared on the subject. Physicians in out-patients' departments groaned when they tried to teach students on a succession of doubtful ulcers, and hospital radiologists complained of the number of cases sent to them. But in general the profession did not grasp what was happening.

Consequently the medical profession was surprised by the flood of cases of peptic ulcer in the Services which began within a few weeks of the outbreak of war, especially among reservists recalled to the Army. It was thought at first that the cases were new developments of peptic ulcer caused by deficiencies in Army cooking. But Newman and Payne (1940) showed that nearly all cases were recurrences of ulcers which had existed in civilian life. It is now agreed that there is

no evidence of any excessive development of fresh ulcers in the Services. The Army had already learnt by experience that even in peace time the presence of a peptic ulcer is inconsistent with the proper execution of the duties of Army routine, and it was a regulation that men so suffering should be invalided out of the Service, except in the case of a few key men. Unfortunately civilian practitioners drafted into the Army as medical officers at the beginning of the war were usually unaware either of this experience or of the regulation. Many hospitals attempted to effect "cures" by treatment and then returned the men to their units as fit for general duty or, even less satisfactorily, as fit for light duty only. The attempts failed, recurrences almost invariably followed and for a period there was considerable confusion and much loss of time. Gradually the correct principles for treatment and disposal became generally understood and the position was satisfactorily controlled.

In the German journals accessible in this country during the war there have been few articles on peptic ulcer, but it is evident that the experience as regards the increase of this disorder in Germany has been similar to that in this country. The rarity in 1914-18 is noted and the increase between the wars. The increased incidence in the Services during the war has been almost entirely due to recurrences of pre-war onset. Opinions are divided as to whether there has been any increase among civilians or in the Forces. The interesting statement is made that the incidence is much higher among non-fighting than fighting troops.

ETIOLOGY

The causes of the development of peptic ulcers are still obscure. A few years ago great attention was paid to the free HCl in the stomach contents but it is possible that this is an exciting stimulus or a concomitant feature rather than an essential cause. There are undoubtedly families in which there is an hereditary predisposition, but heredity alone cannot explain the recent increase in the incidence.

The course of gastric ulcer in girls and young women is of interest in this connexion. It was common in the Victorian age and now is practically non-existent. Obviously this course must have been independent of psychological influences although psychological stimuli may have been the exciting cause for individual perforations and hæmorrhages. Nor can heredity be involved. Nor can tobacco, for the Victorian girl would not have dared to smoke. The modern girl smokes to excess, especially on an empty stomach but she rarely gets a gastric ulcer. Clearly there must have been external factors during that period which acted on young women but not on young men, who almost escaped. It is tempting to connect the disappearance of this type of ulcer with the disappearance of chlorosis, but the causes could not have been identical for there is no evidence that chlorotic girls were prone to ulcers. Nevertheless, it is not impossible that causal factors were related.

The ulcers of this group were undoubtedly acute ulcers. Knowledge of the relationship of acute and chronic ulcers is imperfect, and it is doubtful if it is merely a matter of duration. It is an old observation that symptoms may suggest an acute ulcer whilst operation reveals a chronic form. The recent investigations of Wolf and Wolff (1943) on the "new Alexis St. Martin" have shown that the

appearance of a chronic ulcer can be produced in four days and the stomach return to normal in a further five days. Their observations are also of interest in regard to the relationship of gastritis to ulceration. Nevertheless, there may well be different causes for what have been regarded as acute and chronic ulcers and even more probably for gastric and duodenal ulcers.

Psychological stimuli can undoubtedly induce the onset or more often the recurrence of symptoms and precipitate a perforation or a hæmorrhage. But whilst it is evident that such stimuli can pull the trigger, it is improbable that they can load the gun. Thus the incidence of peptic ulcer in the Victorian age was greatest in young girls, whereas the increase between the wars was mainly in males.

The valuable study by Stewart and Winsor (1942) proved that the incidence of perforation rose rapidly during the severe air raids on London. This observation has been confirmed for other parts of the country, and it has also been found that less marked rises occurred at the onset of war, at the time of Dunkirk, and at other periods of crisis. The percentage of males among these was as high or even higher than in peace time. Thus in Bristol 98 per cent. of the perforations were in males (personal communication from J. Rendle-Short). Women, however, are not entirely immune to these psychological stimuli. At the height of a severe and prolonged air raid on a provincial city, the harassed surgeons of a military hospital were exasperated by a young V.A.D. in whom an ulcer perforated without any previous symptoms. It would appear that some predisposing factors now exist which especially affect males, whereas in the Victorian age there were factors especially affecting young females. While such factors are active, psychological influences may become exciting stimuli.

DIAGNOSIS

The diagnosis of peptic ulcer depends on consideration of the symptoms, physical examination, radiography, examination of gastric contents and fæces, and gastroscopy. The outstanding symptom of an active duodenal ulcer is the well-known "hunger pain," characterized by the punctuality with which it arrives, its occurrence at night and its relief by food and antacids. In the early stages it is often not more than a discomfort or may be merely a "sinking sensation." The site varies, but it is most often felt in the epigastrium to the right of the middle line or high up in the costal angle. Waterbrash is a suggestive symptom, but too much reliance must not be placed upon it. Evidence of hæmorrhage will frequently clinch the diagnosis, it may be revealed by mælena, occasionally accompanied by slight hæmatemesis or by the development of anæmia.

On *physical examination* the recti, especially the right, are often on guard, and may be tender. On deep palpation there is tenderness over the site of the ulcer. This sign is often elicited more successfully by the radiologist than by the physician and there is no doubt that the radiologist has several special advantages. In the first place he can locate the duodenum on the screen and hence knows where to palpate. Secondly, he is in the best position for deep palpation of the abdomen, the patient being erect and directly before him. Thirdly, and most important, the patient has no suspicion that his abdomen is about to be palpated. The unexpected thrust by the radiologist carries his fingers deep into the abdomen.

while the muscles are still relaxed. The physician can partly reproduce these conditions by auscultating the heart in the erect posture and suddenly palpating the abdomen with the left hand.

Radiography is often definite and decisive. The presence of an ulcer crater together with the symptoms may leave no doubt as to the diagnosis. But the duodenum is a small area and difficulties are not infrequent. A healed ulcer leaves a permanent scar, and hence a deformed duodenum is not proof of the presence of an active ulcer, whilst, on the other hand, an ulcer may heal without leaving any definite deformity. Again, the presence or absence of a crater of an active ulcer is not always easy to determine and an inexperienced radiologist may easily make an erroneous decision. The combination of a physician and radiologist both in doubt is too often interpreted as establishing the presence of an ulcer.

Confusion is caused at present by the different meanings attached to the term "duodenitis," and its relation to symptoms exactly or partly resembling those of a duodenal ulcer. Radiologists are not in agreement among themselves, and physicians on the whole are sceptical as to the justification for the diagnosis. Most certainly it should not be used as an easy way out in cases in which the presence of an ulcer is doubtful.

Gastric analysis now takes second place to radiography. The fasting juice is increased in amount and may be 50 to 150 c cm. The acidity is above normal, often high, and is rarely less than 0.1 gm per cent. After a histamine injection the rise is rapid and may reach 0.4 gm. With a fractional test meal the rise is slower, forming a "climbing curve" and rarely exceeds 0.35 gm. Unless the acidity is definitely above the usually accepted normal limits the presence of a duodenal ulcer is improbable, but a high acidity is not proof of its presence.

The results of the *examination of fæces* for occult blood are at present unreliable. When all the accepted precautions have apparently been followed, it still occurs that one hospital will obtain a high percentage of positive results and another hospital an equally high percentage of negatives, and neither may bear any close relation to the established presence of peptic ulcer. Why this should be, it is impossible to say. Several careful studies have been made of the method, but it would appear that some investigation of the discordant results is indicated, if the test is considered worthy of being explored. Until similar results are obtained by equally competent pathologists using the same technique, and these are correlated with the presence of an active peptic ulcer, the test must be regarded as unsatisfactory.

Gastroscopy at present does not enter greatly into the diagnosis of duodenal ulcer. In spite of these difficulties it does not appear that a duodenal ulcer is often missed in a case under investigation. On the other hand, the diagnosis is not infrequently made on insufficient evidence, especially by inexperienced radiologists.

GASTRIC ULCER

Gastric ulcer is a more serious condition than duodenal ulcer and the diagnosis is more difficult. It is easy to draw a clinical picture of an unmistakable ulcer

is epigastric pain closely related to taking food, vomiting relieves the pain, hæmatemesis may have been observed. The skiagrams show a characteristic notch in the lesser curvature. The patient is afraid to eat, and the nutrition suffers. It is by no means uncommon to meet cases which possess all these features, but many cases are not so distinctive and surgery has shown how often the diagnosis may be at fault. Physical examination and gastric analysis may be of little help, for tenderness and muscular rigidity may be slight and the acid often ranges round normal. Antacids may give only partial relief.

It is here that the gastroscope becomes increasingly useful. It may be hoped that gastroscopy will become a routine in the investigation of gastric ulcer, although it should not be allowed to replace radiography, which give a valuable permanent record at various intervals after an opaque meal.

TREATMENT

The *medical treatment* of uncomplicated peptic ulcer has attracted the close attention of highly competent observers of great experience over many years. Elaborate schemes of diet have been composed, and minute directions on a printed sheet may be handed to a patient on his return home from a course of treatment after full explanations from a conscientious dietitian. It is disconcerting to find how frequently the most prized idol of an expert, the corner-stone of his edifice, is ground contemptuously to powder beneath the heel of an equally competent confrere. Too much attention is commonly paid to details. The carefully graduated diets of a few years ago have largely been swept away and with them should go the frills which still decorate such directions.

The first essential of treatment during acute stages is rest in bed. The rest should be both physical and mental, so far as possible. The second principle, to be continued subsequently for a period not to be defined, is that food should be taken at intervals not exceeding two-and-a-half hours and in the earlier stages not exceeding two hours. The third principle is that the diet should be ample in amount, mixed, and include at least 2 pints of milk and a sufficiency of vitamins. At the onset of treatment there must be some graduation in quantity but no elaborate scheme is necessary. Any ordinary item of diet is permissible which can be chewed into a liquid form.

Antacids should be given during treatment, especially in cases of duodenal ulcer. There is a wide choice which may be left to the discretion of the practitioner, for there is little evidence of substantial advantage for any one of them. A preference may be expressed either for aluminium hydroxide or simple carbonates. It is wise to continue antacids subsequently, especially for duodenal ulcer, but they must not be considered to permit long intervals between food.

When a patient relapses, it is common to hear that he has, as he may put it, relaxed his diet. Frequently he has returned to his former irregular meal-times while adhering tenaciously to the direction to take fresh green lettuce but never cabbage, or vice versa as the case may be.

The case against tobacco is strong, but not conclusive. Until it is exonerated, smoking should be forbidden entirely during active treatment and subsequently restricted to forty minutes after the chief meals.

THE RÔLE OF SURGERY IN DYSPEPSIA OF EXTRA-GASTRIC ORIGIN

By R. DAVIES-COLLEY, CMG, MCh, FRCS

Senior Surgeon, Guy's Hospital, Lecturer on Surgery and Surgical Pathology, Guy's Hospital Medical School, Consulting Surgeon, London County Council

IT would be impossible in a short article to deal with more than a few of the many surgical conditions which may, in one way or another, lead to gastric dysfunction, nor would anything be gained by considering those in which dyspepsia is only a secondary feature of an obvious local disease. The following remarks will therefore be confined to pathological states of the abdominal viscera outside the stomach in which the local signs may be insignificant as compared with those of the reflex gastric disorder.

There is abundant evidence of the close correlation of movement and secretory activity between the different parts of the digestive tract, the normal functioning of each individual part depending upon the proper working of the whole, and the failure of function at one level causing its dislocation at another. Of all parts of the alimentary canal the stomach is the most susceptible to the influence of stimuli from outside its walls, and its disorders the most apparent to its owner, so that it is not surprising that dyspepsia is so common a symptom of disease elsewhere. The assessment of the value of dyspepsia as a diagnostic symptom of any particular region may, however, be difficult, owing to the fact that the forms which it takes are not by any means specific and seem to depend as much upon the individual characteristics of the patient as upon their exciting cause. Moreover, exactly similar gastric symptoms are often the main features of psychoneurotic states having no organic disease as a background, and it is precisely at the periods of life when such psychic states are chiefly met with that dyspepsia of obscure origin within the abdomen most commonly occurs. The whole subject is, of necessity, a nebulous one and does not lend itself to the formation of precise rules for diagnosis or treatment, and the object of this article is not so much to paint detailed clinical pictures as to draw attention to the dangers of over-estimation of the value of certain physical signs and methods of investigation, and of accepting the existence of pathological states of which little or no confirmatory evidence is forthcoming, and which common sense must suggest are highly improbable. The matter is one of far-reaching importance because, since laparotomy has been rendered a relatively safe procedure, the habit of regarding vague abdominal symptoms, often on the most slender grounds, as incriminating such organs as the appendix and gall-bladder, has spread alarmingly, and every experienced surgeon must have watched with disquietude the growing number of people from whom one or both of these have been removed with either no amelioration or with exaggeration of their malady. Such operations can only bring discredit to the medical profession, and every effort should be made to prevent their occurrence.

As has already been said, the following survey is not intended to be complete and it is proposed to select only a few of the better known examples of the so-called

‘surgical dyspepsias,’ and to criticize views, still widely held, which appear to be responsible for much unnecessary, and therefore bad, abdominal surgery

THE GALL-BLADDER

Chronic cholecystitis, with or without gall-stones, is probably the most common outside cause of gastric symptoms. The typical case, with its flatulent dyspepsia, eructation, distaste for certain foods, and characteristic colic, pain in the back and in the gall-bladder region, is fully described in the textbooks, and there is no difficulty in either the diagnosis or the choice of treatment. It is only necessary to consider the more obscure case in which the classical signs are lacking and the diagnosis is in doubt. Characteristic colic is absent, definite tenderness of the gall-bladder is not easily demonstrable, and the gastric symptoms are inconclusive. In such cases recourse is usually had to X-ray examination and it is essential to know what reliable information can be obtained by this means.

X-ray examination—Visualization of the gall-bladder after opacol administration will demonstrate the presence of stones or of deformities of the gall-bladder resulting from fibrous contractures or adhesions, and if a manual examination is made on the X-ray table it may be possible to elicit tenderness which had been missed clinically owing to abnormal position of the gall-bladder. Inability to procure a shadow after repeated attempts is strong evidence of advanced inflammatory change, but here the value of X-rays ends, and variation in the depth of the shadow and in the rate of filling and emptying are not reliable evidence of disease, since they depend upon so many factors, psychic or otherwise, which are almost impossible to eliminate.

Another confirmatory test of which much was hoped some years back was the *examination of bile* aspirated from the duodenum after removal by irrigation of its contents and injection of magnesium sulphate to provoke a flow of bile. The presence of bacteria, epithelial cells and an excess of mucus was held to be direct evidence of active cholecystitis, but experience showed that there was no means of proving that the fluid thus aspirated was necessarily from the gall-bladder, and the method fell into disrepute.

The doubtful cases of chronic gall-bladder disease are almost always in women of the menopausal age, and in them by far the most common cause of dyspepsia is the nervous upset inseparable from this period of life, and the problem is a psychiatric and not a surgical one.

It must not be inferred from the foregoing that an exploratory operation is never justified in the absence of unequivocal signs of cholecystitis. Occasions must arise from time to time when symptoms persist after prolonged medical and psychiatric treatment, and in spite of full investigation its possibility cannot be excluded, but they are rare. If, in these circumstances, the abdomen is opened and the gall-bladder appears healthy to the naked eye and no stones can be felt through its walls, the opportunity should of course be taken to examine the other organs for signs of disease, and if none is found the abdomen should be closed without more ado. A gall-bladder, the wall of which is not abnormally thick or opaque and is not adherent to neighbouring viscera, is not the seat of chronic inflammation and there is no excuse for removing it, nor is the slight thickening

parts of the body During the attacks the appendix is somewhat swollen and hyperæmic and its mucous membrane is thick and soggy Often the lowest few inches of the ileum are similarly affected The neighbouring glands are moderately enlarged and light pink in colour, but the peritoneum is not affected Between the attacks the appendix is less swollen, but firmer than normal to the touch, and the glands remain enlarged

The *clinical picture* in small children is one of repeated "bilious attacks" with raised temperature, lasting for a day or two at a time, and there may be only slight local symptoms, although tenderness and guarding in the right iliac fossa can always be elicited Some alteration in the bowel habit is usual, and there may be either constipation or diarrhœa Between the attacks the child is apt to be low spirited, capricious in its appetite and to show signs of abdominal discomfort, avoiding games, and so on In adults and older children the gastric symptoms are less in evidence, although nausea and vomiting may occur during the exacerbations and the appetite may be poor between them The local signs, however, are more marked and pain in the iliac fossa is more constant at all times

Although in some cases the lymphoid tissue of the ileum is inflamed as well as that of the appendix, there is no doubt that the symptoms disappear after appendicectomy, and this is clearly the best treatment

APPENDICULAR COLIC—It is doubtful whether colic resulting from concretions ought to be placed among the dyspepsias, but as the pain is sometimes felt in the epigastrium and may, when severe, give rise to nausea, it should perhaps be included The pain is sharp and fleeting in character and is usually felt locally or at the umbilicus, or occasionally above it Tenderness on pressure over the appendix can generally be elicited, and X-rays may be of assistance in localizing it Occasionally, if of long standing and infiltrated with calcium salts, the concretion is visible in an X-ray film The treatment is appendicectomy

As in the case of the gall-bladder, dyspepsia due to disease of the appendix occurs during a period of life in which functional nervous disorder is extremely common, only in the case of the appendix the period is that of youth and early maturity, and it cannot be too strongly emphasized that dyspepsia at this age, in both sexes, is in the vast majority of cases attributable to neurosis and only rarely to the appendix

The term "chronic appendicitis" is ambiguous and ought to be deleted from the nomenclature of diseases, and appendicectomy for dyspepsia should be reserved solely for the lesions described, which are not as a rule difficult to diagnose

OBSTRUCTIVE LESIONS OF THE INTESTINES

There remains to be considered a group of cases in which the dyspeptic symptoms are the effect, probably through pyloric spasm, of partial or intermittent obstruction of the intestines This may be due, as in the case of appendicitis or inflammatory disease in other situations, to local spasm of the gut wall, or to a number of mechanical causes, such as intestinal tumours, fibrous contractions of ulcers or peritoneal adhesions In some cases the history of an abdominal operation or of peritonitis in the past may be a clear pointer to adhesions, or one of tuberculosis or, occasionally, of a strangulated hernia may suggest the possibility of a circa-

trizing ulcer, and lead to a careful X-ray investigation, but with others there may be nothing in the history to suggest a cause, and for this reason it may escape detection, with serious results. For instance, it is not perhaps widely enough appreciated that gastric upset is not uncommonly the earliest symptom of intestinal carcinoma, and many a rectal growth has been allowed to reach a stage of inoperability because persistent epigastric discomfort, flatulent dyspepsia and loss of appetite directed attention only to the upper abdomen. In the colon and rectum a partial obstruction may cause little or no local symptoms, but in the case of the small intestine, colic is almost always a marked feature, although it may give a very imperfect clue to the precise localization of the lesion.

The following three cases illustrate, on the one hand, the danger of delay in making a thorough investigation and, on the other, the difficulty of arriving at a correct diagnosis in spite of it —

(1) A girl aged fifteen was treated for a year for recurrent "bilious" attacks accompanied by intestinal colic, loss of appetite and rapid loss of weight. At last she suddenly became acutely ill and was admitted to hospital with all the signs of general peritonitis, which was found, at operation, to be the result of chronic stenosing enteritis (Crohn's disease) of the middle of the ileum, with a mesenteric abscess which had burst into the peritoneal cavity. The operation was too late to save her life.

(2) A woman aged thirty had for several years been subject to attacks of vomiting accompanied by colic felt to the left of the umbilicus. Repeated X-ray examinations failed to demonstrate an obstruction, but the frequency of the attacks and the fact that the pain was always felt at the same spot decided me to explore her abdomen. Operation disclosed a Meckel's diverticulum adherent by its tip to and sharply angulating the ileum. The symptoms subsided at once after the removal of the diverticulum.

(3) A girl aged nineteen was admitted with a history of repeated attacks of colic felt mainly in the region of the transverse colon accompanied by nausea and sometimes by vomiting, for which first her appendix and then her gall-bladder had been removed. The attacks persisted and finally a barium enema disclosed a delay in filling at the pelvi-rectal junction. At the operation the whole of the sigmoid portion of the colon was found to be thickened by hypertrophy of its muscle, presumably as the result of neuro-muscular incoordination at the pelvi-rectal junction. Excision of the sigmoid loop resulted in a complete cure.

The points to be stressed are that in the elderly the possibility of obstructing growths of the bowel being the cause of gastric symptoms should always be borne in mind, that repeated attacks of localized intestinal colic are nearly always a sign of organic obstruction and should lead to thorough investigation by barium meal and enema, and, finally, that even if X-rays fail to demonstrate an obstruction, persistence of the attacks is a call for abdominal exploration.

Mention has been made above of peritoneal adhesions, and it should be made clear that these only require surgical treatment when they are definitely causing obstruction. The practice of reopening an abdomen to divide post-operative adhesions in the hope of relieving persistent discomfort has now happily been abandoned. Such operations, like those performed for ptosis of the abdominal organs, only serve to create, or more often to intensify, a neurotic state which makes these patients a burden to themselves and to all around them.

References

- British Medical Association (1927) *Brit med J*, 2, 1063
Edwards, H., and Copeman, W S C (1943) *Ibid*, 2, 641
Moynihan, B (1911) *Ibid*, 1, 241

INDIGESTION DURING PREGNANCY

By F NEON REYNOLDS, F.R.C.S.E.D., F.R.C.O.G.

Consulting Obstetric Surgeon, Hertfordshire County Council, Obstetric Surgeon, Hospital for Women and Children, Harrow Road, Surgeon, Emergency Medical Service

THE term indigestion of pregnancy can be taken to include any deviation from the normal gastric and intestinal functions which are met with in the course of an otherwise uncomplicated pregnancy.

For descriptive purposes there are two main groups—morning sickness, or early vomiting of pregnancy, and indigestion, such a division results from chronological occurrence and custom, derived from certain differences between the symptoms experienced in the early months as compared with those of the later months. It would appear that they are stages of one single condition and will be taken as such in discussing causation, further research may, however, prove them to be separate entities.

ETIOLOGY

The etiology of indigestion of pregnancy is little understood and no organic or other satisfactory explanation has yet been evolved. The different theories which have been put forward may be listed as—

(1) *Neurosis*—There is no doubt that the highly-strung, neurotic or unbalanced patient is liable to suffer much more severely than those who are more placid, but this applies to almost any illness in which subjective symptoms are predominant. Moreover, it is not by any means uncommon to meet with severe suffering in those whom no one has regarded as being neurotic beforehand. There may be examples of pure neurotic vomiting, but this is not proved merely by the cessation of symptoms under treatment of the Weir Mitchell type—rest from physical exertion, household worries and so on, together with suitable feeding, may easily cure by allowing the system to adjust itself to the demands of pregnancy. It is also a dangerous theory, in that too close adherence increases the likelihood of more serious causes being overlooked.

(2) *Toxæmia*—If toxæmia is taken in its usual sense there is little support for this theory, since, even in the most severe cases of ordinary vomiting, e.g. those which do not eventually prove to be hyperemesis gravidarum, no clinical, pathological or chemical evidence can be found of such condition. It is, however, of course, quite possible that some substance may be produced by the developing ovum which causes the symptoms. The term auto-intoxication might be a more apt description of this type of process.

(3) *Carbohydrate deficiency*—The only support here is that the administration of glucose or sugar does, undoubtedly, in some cases bring about relief. Since, however, nausea and vomiting may begin when an expected period is one week late, it is difficult to believe that the glycogen content of the liver has already become exhausted. Nevertheless, intravenous administration of glucose rarely fails to relieve.

(4) *Vitamin deficiency*—Every new discovery is heralded as the cause or cure of most diseases, to none can this be applied more strongly than to the vitamins. It is undoubtedly true that under certain conditions, in certain countries, or in a few individuals, lack of suitable vitamins, especially those of the B group, may come into the picture and should be used in treatment, but as a general hypothesis this suggestion cannot be supported.

(5) *Endocrine*—This is surely the most likely and the most attractive theory. When the vast and intimate changes occasioned in the endocrine system at the beginning of pregnancy are considered, it is astonishing that there is so little upset in the physical and mental conditions of the individual concerned. It is demonstrable that modifications take place in the functions and activities of certain of the ductless glands, particularly in the thyroid, pituitary and, more obviously, the ovaries, but it is likely that more changes than are known, and still less than can be demonstrated, may occur in these and other components of this mysterious system. With increasing knowledge it becomes more and more apparent that all the main and vital functions of the body are controlled directly or indirectly by the ductless glands. Here in pregnancy is a condition which is known to affect these glands, can only occur in the presence of their effective working, and is primarily dependent upon the particular one of these glands specific to the female. Surely, then, the endocrine theory is the most acceptable and the most commonsense of all.

This theory, however, does not help much in the elucidation of the problem, so far as etiology is concerned, and definite proof can only come with increasing investigation and knowledge. There is, moreover, one almost insuperable objection to all or any of the above theories. It may be presumed that the actual process of pregnancy, physical, mental, physiological, or biochemical, must be the same in every case. Why therefore is it possible for Mrs. Jones to be completely free of sickness or indigestion, whereas Mrs. Smith may be semi-prostrated for nine months? It is not sufficient to ascribe the condition as due to excess or lack of hydrochloric acid, to neurosis, toxæmia, and so on, unless it is possible to begin by saying why pregnancy should produce such causes in a woman hitherto untouched by these primary or secondary conditions. All investigations have so far proved inconclusive, whatever line of research is undertaken no single condition, no lack or excess, no abnormality or change in function is found to be present in a sufficient percentage of cases to justify, or even support, any one theory of etiology. Such uncertainty as to cause and actual biological conditions in the individual is necessarily reflected in the efforts at treatment. No definite line can be laid down and the method of trial and error is the only one available.

It is most likely that the upset in metabolism is due to the widespread changes which take place in the whole endocrine system from the moment of conception until some time after delivery. Other factors, such as change in intra-abdominal pressure, the individual nervous and psychological reactions, may be complementary but are not the fundamental causes of the complaint.

There are, too, certain associated conditions which have considerable influence upon the degree of severity of the symptoms. First among these is inefficient evacuation of the bowels, and by this is not meant just constipation nor the absence of the daily motion. It is common for a woman to say quite correctly

that the bowels move each day, and yet for the large intestine to become daily more loaded. The average woman's idea of the most important duty of the day is a hurried visit, fitted in when least inconvenient and without regard to natural urge, lasting perhaps for sixty seconds. Little imagination is required to assess the time spent over the actual business in hand, and the result is a gradually increasing hold-up upon much the same lines as the furring up of a hot-water pipe. It is not suggested that inefficient evacuation is the root cause but that it is an important factor in the maintenance of general health, which in itself must play some part in determining the occurrence or severity of any abnormal condition.

MORNING SICKNESS

Morning sickness is second only to indigestion as the most common of the minor so-called discomforts of pregnancy. It affects all classes of pregnant women and is not, as often supposed, a perquisite of the well-to-do or leisured classes. If, however, leisure is spent cogitating over inner feelings the condition can undoubtedly become aggravated thereby, and considerable strength of mind is needed to force attention in other directions, with resulting benefit. The onset is commonly during the second month and the symptoms usually disappear by the end of the fourth month, though there is much variation both in time of onset and duration. The interesting observation, made quite spontaneously by many patients, has been that their sickness has disappeared with the recognition of foetal movements. I have not, however, been able to correlate these two happenings in a sufficient number to draw any conclusions.

A better terminology than "morning sickness" would be "vomiting of early pregnancy," since it by no means always occurs in the morning, but frequently at other times of the day, particularly the evening, in addition to, or instead of, the morning. It varies in degree from slight nausea to vomiting many times a day, without coming anywhere near a condition justifying the diagnosis of hyperemesis, its peculiarity being, that having eaten and vomited a hearty meal the patient can not only face, but desire, more food, which again may be vomited, still without producing any distaste for further nourishment. Constant repetition for many weeks, with occasional intervals of improvement, is well tolerated and produces no signs of lack of nourishment, such as loss of weight or undue fatigue, which again is a most important distinction from hyperemesis, which invariably has a marked effect upon the general condition. Some patients feel extremely ill in an indescribable way—nausea but no desire to vomit, dizziness of a peculiar type, rather like the "swimming feeling in the head" after influenza, and many other vague but real and acute discomforts.

It has been suggested in the past that reflex irritation from other conditions was the basic cause, but this theory has long since been abandoned. It is nevertheless a fact that patients are met with in whom correction of uterine retroversion or removal of a grumbling appendix is followed by great relief, if not complete amelioration, of symptoms. Therefore a detailed general examination should always be carried out and attention paid to any abnormalities discovered thereby.

MANAGEMENT—This is a better word than treatment, since the condition requires definite managing as distinct from, although combined with, medicinal

remedies A patient should be advised to lead a life as nearly normal as possible, without giving up any of her accustomed work or recreations, except those which are obviously unsuitable during pregnancy Exercise in the fresh air is essential, without it no one can be fit, either physically or mentally; this applies particularly to the pregnant woman and no amount of indoor exercise, such as housework, can be an efficient substitute It is best taken in the form of walking, preferably in two or more outings, as before lunch and before tea Many can, and do, continue such things as tennis, golf, and even horse-riding, but, when asked for advice upon these activities, the only possible answer is that they can be tried experimentally at the patient's own risk, because in a great many cases they are liable to produce miscarriage Bicycling seems to be comparatively harmless, though not a comfortable relaxation after the first few weeks

Overfatigue is highly productive of digestive disturbances and should be avoided If a woman gets up at her usual time in the morning, and otherwise carries out her regular routine, it is of great value to rest, lying down, for at least an hour after lunch, thus making a break in the hours during which she is on her feet It is more effective and more natural than remaining in bed until half-way through the morning and then going all out until bedtime A full night's sleep is necessary, too, and late hours, stuffy restaurants and all that they imply, should be given up

Diet—Certain foods, or types of food, are well known to precipitate sickness and indigestion in the pregnant woman. These are fried or fatty foods, pastries, highly spiced sauces or condiments, and excess of bulk-producing vegetables like cabbage, these, and anything the individual notices to increase her symptoms, should be excluded and the sugar intake amplified by the free use of glucose Otherwise, a diet to which she has been accustomed is the best, but care should be taken that it includes a sufficiency of fresh and uncooked items, especially milk, of which latter one pint per day is a good minimum if tolerated Small meals taken frequently should be the rule, rather than large amounts at long intervals, it is almost universal that sickness comes on as the stomach becomes empty, and is at once relieved by food Those who complain of literal morning sickness, that is, those who are nauseated and tend to vomit immediately upon getting out of bed, should be advised to have something, such as a few biscuits and a cup of weak tea, before moving at all and, to be effective, this must be taken immediately they wake and even before they sit up

The use of alcohol need not be completely banned, many have no desire for this, nor for smoking, and an actual distaste is often an early symptom noticed by the patient herself In those in whom this does not occur, however, the strictly moderate use of either seems to do no harm, and if they form one of the comforting indulgences of life there is no point in depriving the patient of their ease—thus increasing what is often described as the boredom of nine months' discomfort.

It is necessary to have a standard scheme to put into operation when consulted regarding this problem. The following is suggested—

- (1) A complete and detailed examination to exclude any complications or concurrent conditions

- (2) Correct any abnormalities which may be present, such as retroversion and constipation
- (3) Advise regarding diet, times of feeding, exercise, and general mode of life, with special reference to glucose
- (4) Give some alkali as the first step in the trial and error method of covering the individual patient's requirements. A prescription, which is often found successful, is —

R Sodium bicarbonate	2 ounces
Light magnesium carbonate	1 ounce.
Oil of peppermint	30 minims

Made up in the form of a powder one level teaspoonful to be taken in water when required

The patient should be told to sip this whenever the nausea arises. Other useful alkaline preparations are alka-zane, Enos, or any similar effervescing saline. A simple alkaline mixture made up on these lines with the addition of dilute hydrocyanic acid, 3 minims, is worth trying.

- (5) If this produces no relief, injections of oestrin should be given, and it is found that the natural rather than the synthetic preparations are the more effective. Progynon in 5 mgm doses once or, if necessary, twice a week, is perhaps the most suitable, and there need be no fear whatsoever of its producing a miscarriage. This will relieve in perhaps one third of the ordinary cases, and for those in whom it fails extract of suprarenal cortex can be tried. This is best given in small doses, 1 to 1 c cm, of preparations such as eucortone, which again will be found of help in roughly one-third of the remaining cases. There remain then the 30 to 40 per cent of patients who still fail to find any improvement. These are likely to be either of the neurotic type or those in whom the condition is quite severe but who are still able to carry on their daily life. If, however, they are only doing so with the greatest difficulty, the next step is to give intravenous glucose, 5 per cent. in saline, 10 c cm once a week, or more often if necessary. This will produce improvement in almost all to whom it is given, but for the few resistant cases it can be combined with 5 to 10 units of insulin.

If, after working through this programme, which by the way is not often necessary, any patient remains unrelieved, a decision has to be taken as to whether it is a case of complete neurosis or an incipient hyperemesis, and in either event the only procedure to advise is bed under complete nursing conditions, restriction of diet, visitors and so on, on the lines of the Weir Mitchell treatment, under which all will be cured except those needing termination of pregnancy or a sympathetic but firm lecture upon the importance of their making another attempt to carry on for a few more weeks, by which time nature will have eased their suffering. It is however, uncommon to be forced to go right through this programme in any one patient, since either the simple remedies have effect or a condition is quickly reached for which the more drastic measures referred to are instituted. In dealing with these patients it is desirable to try to strike a happy medium, not regarding their complaints too much in the light of what every woman must expect and

therefore that no attempt should be made to give relief, at the same time avoiding a too grave and heavy attitude, which will produce equally bad results. A sympathetic understanding of this particular problem lays the foundations for that mutual confidence which can by itself ease many of the fears and trials so often associated with pregnancy.

INDIGESTION

Indigestion is by far the most common of the so-called minor ailments or discomforts of pregnancy. It is extremely rare to look after a patient throughout this period without being asked to give advice regarding some form or other of dyspeptic symptoms, and yet this condition is almost completely ignored in all textbooks upon obstetric or antenatal care. One reason for this omission must surely be the lack of knowledge concerning the etiology of the condition, and this in turn is perhaps largely due to familiarity producing contempt.

Minor though this complication may be, it is yet an important factor in a woman's feelings when deciding for or against repeated pregnancies, and is certainly a common item in producing that "never again" attitude which is responsible perhaps in part for the present situation as regards the birth rate in this country. It is possible to guarantee that a patient will look back upon her labour with complete equanimity, but how impossible to give the same assurance concerning even this one discomfort of pregnancy. Figures and statistics are boring and fallacious, but it may be stated that no fewer than 75 per cent of cases recently reviewed complained of severe indigestion.

SYMPTOMS—These are of such variety that they can be extended almost *ad nauseam* in regard to detail, but in the main they comprise the following complaints, each of which will be dealt with more specifically later on: heartburn, nausea, palpitation, retrosternal pain, epigastric pain, flatulence in various forms such as distension, "full up after a small meal," "a feeling as if I had swallowed a tennis ball which has stuck." Any or all of these symptoms may occur in the individual patient, some in combination, others separately, varying in severity, duration or time of occurrence. The time of onset varies greatly, it is common for morning sickness to disappear during the fourth calendar month, to be followed by an interval of exceptional well-being. The lucky ones maintain this condition for the remainder of the pregnancy, but the majority gradually slide into a state of chronic indigestion, well established by the end of the sixth month. From then on, while general health remains good, life is apt to be clouded by ever recurring and often increasing symptoms of maldigestion, which persists, only to disappear almost miraculously at the conclusion of the third stage of labour. It is quite extraordinary how a patient after months of discomfort can satisfy, within a few minutes of delivery, her craving for a cup of tea without paying the penalty to which she has become so accustomed.

What investigation is necessary when the practitioner is asked for advice for indigestion during pregnancy? As a rule, no intricate laboratory tests or X-ray examinations are called for, and a careful general overhaul permits the conclusion that the symptoms are due to the pregnancy. But, as in all medical problems, it is necessary to be careful not to take too much for granted. The general overhaul

must be complete and detailed and certain symptoms demand special investigation. If complaint is made of retrosternal or epigastric pain, palpitation or breathlessness, beware. The lighthearted dismissal of such symptoms will sooner or later end in tragedy for a patient and shame for the practitioner. Oesophageal, gastric, or cardiac conditions can, and do, arise during pregnancy, so, too, can appendicitis or ureteric calculus, pneumonia or gall-stones. It is dangerously easy at that most important stage of onset to dream momentarily of wind and constipation, of sodium bicarbonate and cascara, only to endure the more prolonged nightmare of the missed appendix and the accusing looks from the relations of the deceased!

TREATMENT—Before starting active treatment it is necessary first to go into such matters as diet, exercise and mode of living. In these respects what has been said with regard to morning sickness applies also to indigestion, and the same rules should be followed. Reference must, however, once more be made to the effects of constipation. The old gag about what a woman does once a day, once a week and once a month contains more than a modicum of truth, and it is useless to attempt the treatment of indigestion in the presence of an irregularly or incompletely acting bowel. Mild aperients taken regularly are better than stronger remedies when required, since by then the harm of resorption is done, or alternatively the "when required" is interpreted as "Saturday night," and not then unless it is quite convenient. Vegetable laxatives, such as senna pods, should be preferred to the various preparations of liquid paraffin, which in themselves are not exactly carminatives, mild effervescent salines or milk of magnesia are often sufficient. Individual tastes and requirements vary so greatly that quite often the suitable aperient can be discovered only by the method of trial and error, and no one preparation can be given pride of place. Whatever will produce a single, easy, non-fluid and comfortable motion each day is the right aperient for that particular patient.

THE INDIVIDUAL SYMPTOMS

(1) *Heartburn*—This is the most disabling and, in those seriously affected, the most persistent of all discomforts which together have been classed as forming the syndrome of pregnancy maldigestion. It is not, however, in its severe form, a common complaint, not more than 20 per cent. of patients suffer from it, except to a minor and intermittent degree. The time of onset varies, but is generally after the first four months, and it has a curious tendency to improve during the last four weeks, this in spite of such theories of causation as are concerned with increasing pressure on the stomach. It is, too, a symptom which may have its own particular and private etiology, so that it is necessary to digress for a moment to consider its possible causes. Owing to its nature different alkaline media have been used for relief or cure, hyperacidity has for long been thought to be the basis of causation. It is a curious fact, yet nevertheless a fact, that the hydrochloric acid content of the stomach is reduced below normal level during pregnancy. This has been tested by different workers by means of samples taken after the passage of a stomach tube, the results have been no more convincing than that nearly all show a reduced HCl content which, in addition, varies considerably during the different weeks of pregnancy, or different hours of the day. Moreover,

the degree of acidity appears to have no bearing upon the absence or presence of heartburn, patients with marked decrease in the HCl content of the stomach are equally immune from, or liable to, heartburn as those with a normal or excessive acidity. American workers have investigated by X-ray examination the motility and changes in position of the stomach and gastro-oesophageal junction. Their results show the same inconsistency, both in actual findings and in the relation between findings and symptoms, as in all other investigations.

It would appear, however, that as a rule gastric motility is reduced during pregnancy; that the normal rhythm of gastric and oesophageal peristalsis becomes regular, with a consequent delayed emptying of the stomach, increasing as that organ becomes more horizontal, and that any stimulation of the gastro-oesophageal action will produce heartburn by inducing reversed peristalsis. Herniation of the gastro-oesophageal junction has been demonstrated with a return to normal a few weeks after delivery. All this would tend to show that an upset in the neuromuscular mechanism may be at least one factor in producing this symptom.

In spite of the foregoing it is necessary to start with kindergarten methods to discover to which treatment each individual will best react. Alkaline powders or mixtures come first and the strength or dosage should be on the heroic scale. One or two tablespoonfuls of the proprietary stomach powders, sal volatile, one teaspoonful in one ounce of water, and so on, must be tried before casting them aside as useless. A few patients find that sucking soda mint or Jenner's lozenges provide reasonable comfort. Dilute hydrochloric acid, 10 minims, taken during or after meals will relieve a few and, here as in other conditions, such relief is immediate and described by patients as "almost miraculous." The hydrochloric acid can be taken in liquid form mixed with syrup and water, or more conveniently as tablets of betaine.

When these simple remedies fail the practitioner is sometimes faced with a patient whose only time of comfort is actually during a meal, and who then suffers in acute exacerbation lasting perhaps an hour before settling down to her normal state of great discomfort. These unfortunates, though rare, are reduced to the utmost misery and should be treated by injections of prostigmine, 0.005 gm., given intramuscularly. This can be repeated as required without fear of inducing uterine contractions, to those whom it helps it is rarely found necessary to give more than one injection a week and it seems to have an increasingly lasting effect. This lends support to the theory of reduced motility and reversed peristalsis.

Vitamin B with thiamine, nicotinic acid and other combinations have been used with a resulting increase in the HCl of the stomach, but the effects upon heartburn are not sufficiently convincing to warrant any conclusions.

(2) *Nausea and vomiting*—Nausea and vomiting during the latter half of pregnancy are not very common complaints and should always be regarded with suspicion. These symptoms are more apt to occur in those who may be classed as "livery" subjects, who cannot in normal times digest more than a limited amount of fatty or rich foods and are liable to "sick headaches." Such patients are often cured by the occasional administration of three small doses of calomel, 1/6 grain after meals, followed by Epsom salts, one-and-a-half teaspoonfuls in one ounce of water first thing the following morning; they should then lie on the right side

must be complete and detailed and certain symptoms demand special investigation. If complaint is made of retrosternal or epigastric pain, palpitation or breathlessness, beware. The lighthearted dismissal of such symptoms will sooner or later end in tragedy for a patient and shame for the practitioner. Oesophageal, gastric or cardiac conditions can, and do, arise during pregnancy, so, too, can appendicitis or ureteric calculus, pneumonia or gall-stones. It is dangerously easy at that most important stage of onset to dream momentarily of wind and constipation, of sodium bicarbonate and cascara, only to endure the more prolonged nightmare of the missed appendix and the accusing looks from the relations of the deceased!

TREATMENT—Before starting active treatment it is necessary first to go into such matters as diet, exercise and mode of living. In these respects what has been said with regard to morning sickness applies also to indigestion, and the same rules should be followed. Reference must, however, once more be made to the effects of constipation. The old gag about what a woman does once a day, once a week and once a month contains more than a modicum of truth, and it is useless to attempt the treatment of indigestion in the presence of an irregularly or incompletely acting bowel. Mild aperients taken regularly are better than stronger remedies when required, since by then the harm of resorption is done, or alternatively the "when required" is interpreted as "Saturday night," and not then unless it is quite convenient. Vegetable laxatives, such as senna pods, should be preferred to the various preparations of liquid paraffin, which in themselves are not exactly carminatives, mild effervescent salines or milk of magnesia are often sufficient. Individual tastes and requirements vary so greatly that quite often the suitable aperient can be discovered only by the method of trial and error, and no one preparation can be given pride of place. Whatever will produce a single, easy, non-fluid and comfortable motion each day is the right aperient for that particular patient.

THE INDIVIDUAL SYMPTOMS

(1) *Heartburn*—This is the most disabling and, in those seriously affected, the most persistent of all discomforts which together have been classed as forming the syndrome of pregnancy maldigestion. It is not, however, in its severe form a common complaint, not more than 20 per cent of patients suffer from it, except to a minor and intermittent degree. The time of onset varies, but is generally after the first four months, and it has a curious tendency to improve during the last four weeks, this in spite of such theories of causation as are concerned with increasing pressure on the stomach. It is, too, a symptom which may have its own particular and private etiology, so that it is necessary to digress for a moment to consider its possible causes. Owing to its nature different alkaline media have been used for relief or cure, hyperacidity has for long been thought to be the basis of causation. It is a curious fact, yet nevertheless a fact, that the hydrochloric acid content of the stomach is reduced below normal level during pregnancy. This has been tested by different workers by means of samples taken after the passage of a stomach tube, the results have been no more convincing than that nearly all show a reduced HCl content which, in addition, varies considerably during the different weeks of pregnancy, or different hours of the day. Moreover

INDIGESTION IN OLDER CHILDREN

By C. PAGET LAPAGE, M.D., F.R.C.P.

Reader in charge of the Department of Diseases of Children, Manchester University, Physician, Royal Manchester Children's Hospital and to the Children's Department, St Mary's Hospital, Manchester

INDIGESTION means failure to digest food effectively and with comfort. It is usually taken to refer to disorders of the upper digestive tract and the liver.

Acute gastric indigestion causing pain, vomiting and collapse arises from the ingestion of unsuitable foods or from undue exercise with exposure and mental stress. *Acute gastritis* has a more organic basis and may be due to infections or corrosives. Much mucus is present and the inflammation generally extends to the upper intestinal tract.

Chronic indigestion is shown by symptoms like furred tongue, offensive breath, constipation, headache, irritability, yawning, drowsiness, rough areas in the skin, anorexia of appetite, nausea and gastric discomfort, eructations, waterbrash, stomach cough and vomiting of mucus, gastric distension and peristalsis and epigastric tenderness. It may also cause reflex disorders of behaviour with irritability, tic, disturbed sleep and speech and nervous habits.

ETIOLOGY

A consideration of cases shows that indigestion follows repeated acute attacks or chronic digestive disease in infancy, continued imbalance of diet with excess of any one indigestible constituent, continuous fatigue due to lack of sleep, physical and mental stress, and the cumulative effects of a chronic septic focus or disease. Dispositional tendencies and mechanical factors have also to be taken into account. The causes of indigestion to be considered can be arranged under the headings—

- (1) Metabolic and biochemical, i.e., underfeeding, overfeeding, constipation, liverish, bilious, hepatic disorders and mental and physical stress with excessive waste products, dispositional and exudative, and occasionally parasitic infections.
- (2) Infective, from a focus like infected tonsils, adenoids, teeth, glands, bronchial or mesenteric, appendix and pyelitis.
- (3) Mechanical, by kinks and bands, pyloric spasm and perhaps foreign bodies.

Metabolic influences—Slow starvation or continued deficiency in vitamins may cause debility and anorexia, especially if there is mental stress. In such cases, because digestive tolerance has not yet been upset, sleep and mental rest soon restore function. But an unbalanced diet will, if continued long enough, so overload metabolism, that persistent and intractable indigestion and intolerance supervene. Symptoms may, however, not appear for some time because most children have a high initial degree of digestive power. Still even this high degree of tolerance is nowadays often overwhelmed by the fashion for the fatteners and for the high vitamin content foods rather than for the body-building proteins and the fuel-forming carbohydrates. Constipation too may cause toxic absorption, either from stasis or through the disturbing effects of unwise purgation.

Dispositional peculiarities in exudative children may mean that dislikes of food like fish, cod-liver oil, milk, orange juice, and vitamin D preparations may be not fads or fancies but genuine aversions, because they are founded on actual reactions like sickness, flatulence and urticaria. Furthermore, exudatives who overfeed, in spite of the fact that they are katabolic and rapidly use up the food they absorb, tend to develop indigestion and catarrh. Being intense they also add to their metabolic overload by reacting strongly to mental and physical strain and thereby loading the blood with waste products. They are often "bad at breakfast" and may take only a small meal then but will enjoy the later meals when the metabolic activities have awakened.

Nervous —The "Monday morning headache" of the child who is timid about school is a well-known symptom.

One girl patient of mine used to vomit every morning just before starting for school until it was found that she had an anxiety neurosis about her journey. She had to change buses half way with only a few seconds to spare. Once the dread of missing the second bus was removed she was all right.

In another case a boy of ten was sent to me because he had colicky pains near the umbilicus and brought up much wind after each meal. There was no vomiting or nausea but he was much distressed and the condition really suggested some form of obstruction. However the parents, after being told to watch for awkward swallowing, found that this was the place and by telling him to eat more carefully were able to relieve most of his symptoms. This boy was subject to tic and an inquiry showed that he was in great fear of one teacher.

Phobias and fancies may arise from parental example or from resistance to suggestions and forcing of food early in childhood.

Real hysterical anorexia is comparatively rare, but girls, and occasionally boys, may fall into a hypochondriacal state and develop a form of negativism and food refusal. They seldom go so far as the passionate food refusal of the young child but they may reach a state when nervous reactions and a negativistic mental attitude make them so capricious and exacting that they may even starve themselves in self-pity. Jealousy of the attention given to another child may also play its part. If, as is often the case, a septic focus adds toxic effects the indigestion is the more difficult to cure.

Infective conditions —Local inflammation of the gastro-intestinal tract may cause temporary abnormalities of juices, glands and lining membranes. The gastro-hepatic duodenal area may be subject to recurrent catarrhal attacks, a bilious attack with loss of appetite and perhaps vomiting. These attacks are often connected with recurrent tonsillitis. The child has pain in the duodenal area and chronic form of dyspepsia. Often the recurring attacks cause liverish symptoms with pale stools but actual jaundice is uncommon. A "grumbling" appendix often causes indigestion.

Septic foci in general act by their prolonged toxic action on general health and metabolism and may also cause postural faults which may affect digestion by lack of tone. Septic tonsils and adenoids, ears, teeth, glands and chronic pyelitis are examples, and if they occur in conjunction with metabolic disorder the two forms combine to form a vicious circle which may be difficult to break.

Intestinal parasites probably have mild toxæmic biochemical effects which may pass unnoticed because attention is directed to the colicky pains and external signs.

Mechanical causes of indigestion are not so important in childhood as in adult

life Real ptosis is rare but some degree of stomach dilatation is not ' Splashings may or may not be important

One boy, seen recently, by working his abdominal muscles vigorously showed me his with great glee, and in his case their presence did not seem to indicate anything serious In another case, there was some degree of pyloric spasm which had followed repeated attacks of gastro-duodenitis

Actual persistence of pyloric stenosis into later life is probably rare My colleague Mr H H Rayner, tells me that though he has, during many years experience, been at pains to find such cases in adults he has seen only one case which suggested a persistence of pyloric stenosis

Bands and adhesions may follow previous abdominal tuberculosis and occasionally there is a congenital kink high up Hirschsprung's disease and faecal collections with loose stools passing through a channel are unusual lower-bowel conditions all of which may cause signs of indigestion.

DIAGNOSIS

Personal history—A careful history is a most important help to diagnosis and while it is being taken the child should usually be out of the room until wanted for questioning

An inquiry about the diet will show deficiencies, irregularities, imbalance and overfeeding Furred tongue and offensive breath, urticaria (heat lumps), patches of skin roughness, urates or acidosis, point to a metabolic overload

Waterbrash and sour regurgitation point to pyloric spasm Discomfort and fullness in the upper abdomen point to upper bowel dyspepsia and colic to lower Pale stools indicate defective secretion of bile Recurrent looseness of the bowels with or without mucus may indicate persistent inflammation of the bowel lining and perhaps an inflamed mesenteric gland which, although it is a "closed" tuberculous focus, still gives abdominal pain. Lienteric diarrhoea is usually associated with nervous excitability and perhaps a palpable spastic colon and sudden bowel emptyings with mucus Pica indicates gastric irritability, and unnatural hunger, queer behaviour with nervous irritability and irregularity of symptoms and a capricious finicky appetite point to a psychological cause with inferiority complex

The family history may show nervous tendencies in the parents and an anxiety neurosis of the mother which may lead her to force certain foods and to press her own likes and dislikes on the child with bad results, or again, it may disclose parental tendencies to metabolic illnesses, like milk intolerance in infancy, acidosis in childhood, bilious attacks, migraine, eczema and a gouty tendency, which may indicate that the child is of the exudative type

PHYSICAL EXAMINATION OF THE CHILD—The child can now be brought into the room, put at ease, questioned judiciously about symptoms and watched while the mother is taking the clothes off Facial pallor, sallowness, "liverish" rough patches are noted Lines between the eyes or round the mouth and nose, nail biting, tic, and self-conscious, "silly" behaviour show a psychological origin

Pallor does not always mean anaemia Exudatives are pale, though their blood count is normal The dark rings under their eyes lead to unfounded maternal fears of anaemia or kidney disease The symptoms are, however, of metabolic origin, and if a cloud of albumin is present it is only orthostatic

prolonged period of rest is needed. Exercise tends to promote blood circulation and so encourage toxæmia, a fact which is not properly appreciated by parents and others who have to deal with this type of case.

Change of air, residence in a milder, drier climate, the use of ultra-violet rays and the effects of massage as a restful and a general restorative must be remembered. Later, when circulation through any septic focus is closed, steady short spells of exercise or of drill, dancing or rhythm exercises are of great use in promoting metabolism and healthy tiredness. A spell of rhythmic exercise is a great soothing agent psychologically. It rests and refreshes the autonomic nervous system.

DISPOSITIONAL ELEMENTS

In my experience exudatives form a class in themselves. Unless they are properly managed as regards exercise, emotions and eating, they will, once they have started the metabolic habit, continue to pass through sequence after sequence of gradual accumulation of metabolic overload, followed by some exudative discharge, such as acidosis, urticaria, eczema or colitis, and then a period of freedom. Repetition of a habit brings with it ease of excitation, and if the metabolic habit is complicated by the effects of a septic focus, a vicious circle is formed which is difficult to break. Exudatives show in this way urates, migraine, acidosis, eczema, colitis and, in later life, gouty tendencies. If overloaded with milk fats they tend to catarrh and there may be some truth in the old saying that "milk makes phlegm." Diet should therefore be restricted in rich fatty foods like creamy milk, butter, milk chocolate, cocoa made with milk and rich bone stock. Rich combined fatty tonic foods are not suitable nor is cod-liver oil or excess of the citrus fruits. Exudatives can have plenty of food but it should be plain and should have in it a large proportion of proteins. Thick bread and thin butter should be the rule. Sugar and starches are allowed and so are all flesh foods, fish, fowl, meats and rabbit together with vegetables and puddings. Meat fats are usually well digested and fried foods are allowed. Often a little vinegar or pickle will help the child with a mild hypochlorhydria. For instance chips and vinegar are often a treat. Cheese, bacon, and marmite are allowed. Plenty of fluid, water, weak tea, but not too much milk. A "mineral" is better than orangeade or lemonade.

Medicinally, alkalis like magnesia and sodium bicarbonate are useful. Exudatives are often well suited by a dilute hydrochloric acid mixture with or without pepsin because they often have a mild hypochlorhydria. Many do well with the help of a mild rhubarb and soda mixture given in a dose which does not gripe or purge but acts as a mild persistent alkaline aid to metabolism. This may have to be taken for months or years and can be regarded as a table medicine and not as a drug.

PROGNOSIS

The prognosis in indigestion is good if a correct diagnosis is made and the patient is treated on the above lines. But it is most important to insist on detail in history taking and examination and to carry on treatment for a sufficient period of time. And for correct diagnosis the importance of a careful and detailed history must once again be emphasized.

INDIGESTION IN INFANCY

By F. M. B. ALLEN, M.D., F.R.C.P.

Physician, Belfast Hospital for Sick Children, Physician in Charge of Infants, Royal Maternity and Jubilee Maternity Hospitals, Belfast, Lecturer in Infant Hygiene and Diseases of Children, Queen's University of Belfast

DIFFICULTY in digesting breast milk or a modification of cow's milk is often imaginary than real. It must be remembered that vomiting is frequently attributable to factors other than indigestion, pain may be caused by colic and crying may be due to hunger, whilst unnatural motions are more often the result of irregular alimentary motility than of "indigestible" intestinal contents.

PROTEIN INDIGESTION

Protein is present in milk mainly as casein and soluble whey proteins, such as lactalbumin and lactoglobulin. It is only the former which gives rise to difficulty of digestion, and in cow's milk this is especially so as it contains 3 per cent. casein as compared with 0.7 per cent. in breast milk. Some infants vomit cow's milk casein and suffer from colic due to the passage of masses of protein curd along the small intestine. The explanation is that human milk is suitably buffered to facilitate digestion in the infant's stomach, whereas cow's milk has a higher buffer value, so that a heavier demand is made upon the available free hydrochloric acid to neutralize the alkaline salts and to attain the optimum pH for peptic digestion. Normally this difficulty in artificial feeding is overcome by the free hydrochloric acid of the gastric juice, but in a few cases special measures have to be adopted. If the infant's resources are not adequate, curd is vomited, and colic, with the passage of casein masses in the motions, occurs. This is associated with crying and loss in weight, and if the situation is not fully appreciated the strength of the milk mixture is weakened, resulting in further crying (from hunger) and increased weight loss.

It is possible that babies with typical curd indigestion are congenital achlorhydrics. The milk may be diluted with cereal gruel (barley water, rice water) and citrate may be added, or it may be acidified with an organic acid (lactic acid or lemon juice) to modify the curd and render it more easily digestible. Addition of lactic acid is the most rational of these measures as it achieves the desirable pH with facility. The acid should be added to sterilized or pasteurized milk, drop by drop, until a fine curd occurs, about fifty drops being required to acidify one pint. If a baby vomits lactic-acid milk, either it is not properly prepared or the condition is not one of protein indigestion. Lactic-acid milk has other uses too, as it is appropriate when concentrated feeding (e.g. after illness) is desirable, or in the presence of diarrhoea. Lacidac (Cow & Gate, Ltd.) is a dried lactic-acid milk preparation one measure of which added to one ounce of water reconstitutes one ounce of lactic-acid milk.

FAT INTOLERANCE

As with protein so with fat. Perhaps more infants find difficulty in dealing with the fat in cow's milk than with the protein. It is true that the amount of fat in

PYLOROSPASM

This may arise in infants of nervous temperament and also in some in whom there is gastric irritation of a nature which provokes spasm of the pylorus. The condition resembles pyloric obstruction in the projectile character of the vomit and, depending on the amount of food lost, constipation and failure to gain (or even loss of) weight. The pylorus is never palpable nor is gastric peristalsis visible and a rapid response follows appropriate treatment. The mother should be reassured and a dose of a mixture containing tincture of belladonna 3 minims, bismuth carbonate 4 grains, sodium bicarbonate 3 grains, peppermint water to 60 minims given to the baby before feeds, or eumydrin or pylostropin may be used. The response to one of these is more rapid than in pyloric stenosis and serves to establish the diagnosis without radiography.

RUMINATION

This condition is not so rare as to deserve omission from this consideration of indigestion. There is little doubt that the habit of regurgitation of food is a neurotic and comparable with thumb-sucking, bed-wetting and other less desirable habits. The elucidation may be puzzling unless the baby is observed in the act of "vomiting." It will be seen to make movements of its mouth and throat, or even to be observed putting its fingers into its mouth to cause food to regurgitate from the stomach. The infant is obviously proud of its feat and derives considerable pleasure from the experience.

The treatment includes thick cereal feeding or splinting of the arms to prevent flexion of the elbows, thereby making it impossible for the infant to irritate the pharynx with its fingers.

CONDITIONS OF THE ŒSOPHAGUS

Œsophagitis and Œsophageal obstruction can masquerade as dyspepsia and other conditions which, while admittedly unusual, can cause difficulty in diagnosis. Œsophagitis is almost always due to thrush infection and is associated with stomatitis. It has been known to follow only mild mouth infection with *Candida monilia*. The condition is often fatal, but treatment should be attempted with a drug such as a suspension of acriflavine in equal parts of water and glycerine (1 in 1000) applied fairly generously to the mouth and pharynx. An aqueous solution of gentian violet (2 per cent) applied to the tongue and buccal mucous membrane as a paint is an effective means of treating thrush stomatitis.

Œsophageal obstruction may be due to spasm or atresia. The origin of the former is not understood, the latter is a developmental defect similar to atresia of the duodenum, colon and elsewhere in the alimentary tract. Sometimes the vomit is large and forceful, suggestive of pyloric stenosis, but it does not occur so often. It may be mistaken for mismanagement of nursing technique, but regulation and observance of this does not relieve the vomiting. It is advisable to make an X-ray examination of an opaque meal passing down the Œsophagus when the condition of spasm or atresia will be revealed. If the infant survives some weeks there is at least a narrow channel, the opening of which can be explored with an Œsophagoscope and dilated, first at weekly and then at longer intervals. Complete occlusion of the Œsophagus is incompatible with life unless a gastrostomy is performed.

THE EARLY DIAGNOSIS OF CARCINOMA OF THE STOMACH

By E C WARNER, M D, F R C P

Physician, Charing Cross Hospital

CARCINOMA of the stomach is one of the nightmares which besets a physician as it is so easy to overlook the correct diagnosis in its earlier stages, the symptoms may be misleading, or may be entirely absent until the disease has reached a stage at which it is past remedial operation. So often are patients seen in whom the disease has already reached the stage of a large fixed tumour in the upper abdomen, or with obvious secondary deposits in the liver or peritoneum, even at the first consultation. The frequency of the disease is shown by the 12,690 deaths in England and Wales in 1942, and of 38,000 persons annually in the United States of America (Easterman and Balfour, 1936).

When taking a clinical history, the age of the patient is of prime importance: a history of indigestion in a young person suggests a simple dyspepsia, perhaps a peptic ulcer, but when the patient is past forty years of age, the possibility of a growth looms much larger. At least 95 per cent. of patients are over forty years of age (Easterman and Balfour, 1936), and in thirty consecutive cases studied at the Charing Cross Hospital twenty-eight were over forty years of age, and the remaining two patients were both thirty-nine years old. In other words cancer of the stomach is rare before the age of forty. Men are often said to be more prone to the disease than women, even in the proportion of 3 : 1 in America, but in this country the sex incidence in men preponderates only to the extent of 4 : 3.

EARLY SYMPTOMS

The earlier symptoms fall, in the main, into four groups —

(1) *Simple dyspeptic symptoms* are perhaps the most misleading, but when a series of case histories is re-examined, an early history of epigastric discomfort, with flatulence and a sense of fullness while eating, or shortly afterwards, which may or may not be associated with pain, is frequently observed. "Belching" may follow in an abortive attempt to relieve the fullness.

H K., aged sixty-six, for two months had discomfort in the epigastrium with flatulence, later vomiting, a poor appetite and loss of weight were complained of, and investigation revealed a carcinoma on the lesser curvature of the pyloric antrum.

The feeling of fullness after a small meal is probably due to the carcinoma producing a rigid stomach wall, which can no longer expand to receive food. When a patient is only able to take a small volume of food or drink at a time, this is a sure indication of widespread involvement of the stomach wall. The associated sense of flatulence is often aggravated by fermentation due to the absence of HCl.

Loss of appetite is more commonly known to be a suggestive sign but it is not

(4) *OTHER SYMPTOMS* which may occur are —

(a) *Anæmia* A growth in the body of the stomach may attain a large s



FIG 1B Large cancer in middle of the body of the stomach

without local symptoms or signs, until the patient seeks advice on account of the anæmia

C G, aged fifty-four, had for a year become progressively short of breath and pale. For three months she had completely lost her appetite, and more recently still complained of epigastric flatulence and vomiting. She had lost 2½ stone and her hæmoglobin was 51 per cent. Occult blood + + + X-ray showed a carcinoma of the pyloric antrum

The anæmia is usually hypochromic in type, but is rarely hyperchromic

(b) *Hæmatemesis and melæna* rarely arise from a neoplasm of the stomach (under 5 per cent of cases) and when hæmatemesis does occur, this is a strong argument for believing the cause is *not* of malignant origin. On the other hand, slow bleeding is common, and a "coffee-ground vomit" is highly suspect. It appears as if malignant disease in the stomach tends to limit its own blood supply, making large hæmorrhage improbable.

(c) *Sudden perforation* is likewise rare, but every surgeon with experience of gastric disease will be able to recount cases of this type. The infiltrative properties of a growth cause it soon to become adherent to other structures and so to protect itself from the consequences of perforation into the peritoneal cavity.

(d) *Loss of weight and asthenia* are two characteristic symptoms. Although loss of weight is common to many dyspeptic syndromes, when met in association with a complaint of tiredness and progressive lack of energy, the condition in later stages often heralds malignant disease in the stomach, which should be sought for. Medical treatment may cause temporary abatement of the symptoms, and even allow a gain of a stone or more in weight for a time, but the improvement can only be temporary. It is interesting to note how frequently the many forms of gastritis, carcinoma of the stomach and other gastric disorders are associated with a complaint of lethargy, as if there were some essential link between the two conditions.

(e) The symptoms of secondary deposits, particularly *ascites*, may be met early, but usually are late in making their appearance.

(f) Other primary or early symptoms more rarely found are *persistent diarrhæa* (particularly with a "leather-bottle" stomach), *phlebitis* and *polyneuritis*.

INVESTIGATIONS

When a suspicion of cancer of the stomach arises, a full investigation of the case is an absolute necessity.

CLINICAL EXAMINATION may reveal nothing, especially if the diseased area of the stomach is overlain by the left costal margin. But in some an area of tenderness in the mid-epigastrium, or in the left hypochondrium, or perhaps a definite tumour will be found. Sometimes the size of the tumour will be out of proportion to the symptoms, and it will be wondered how such a large tumour could possibly develop without giving itself away earlier. These "silent tumours," common in the more capacious body of the stomach than at either end, may yet be operable so long as they are still mobile and not too adherent to other organs.

Unlike a simple ulcer, malignant disease seems rarely to produce rigidity or "guarding" of the overlying muscles, and when rigidity is prominent malignancy is less likely to be present.

A clinical examination is never complete without examination of the areas in which secondary deposits may be found. Thus the left supraclavicular fossa, the liver, the peri-umbilical region and especially the pelvi-rectal pouch must always be examined. How often has a rectal examination by a physician or surgeon blessed with a long right index finger revealed the tell-tale hard masses in the peritoneum in front of the upper part of the rectum (the "rectal shelf"), or even an ovarian tumour as described by Krukenberg.

themselves Typical radiographic findings are shown in fig 1A, 1B, 1C

A *fractional test meal* can be almost as informative, but there is a good deal of misconception as to the results in cancer of the stomach Broadly speaking there are two distinctive findings, as shown in fig 2A, 2B, and 2C

The first type of curve is the most classical There is often complete absence free HCl, but a high "total acid" curve, quite distinct from that of pernicious anæmia (fig 2C) The difference lies in the fact that the free acid titrated HCl only, whereas the total acidity represents also the titration of the weak organic lactic and butyric acids produced by fermentation and decomposition in the stomach

The second type of curve illustrated by curve 2B shows that free HCl may be present in normal or even excessive amounts, and with correspondingly little difference between the free HCl and "total acid" curves, for in this case fermentation is inhibited by the free HCl present It cannot be too widely known that a test-meal curve such as this now under discussion can be present side by side with cancer of the stomach Hurst believes that curve 2A is due to "gastric cancer" and curve 2B to "ulcer-cancer," indicating two separate predisposing causes of gastric cancer When small amounts of altered blood are present throughout, with either type of curve, diagnosis is correspondingly simplified.

Occult blood tests in the stools are most valuable It is characteristic of most carcinomas of the alimentary tract that they bleed in slow but continuous fashion and this in itself will enable altered or "occult" blood to be identified in the stool often in considerable amounts If after suitable preparation three specimens of stool are examined on successive days and none contains any occult blood, carcinoma is extremely improbable, and in all cases met with over a period of years in only one was this test consistently negative, and yet a carcinoma of the stomach present

Gastroscopy is the latest method of examination added to the armamentarium of the clinician Its use is more fully described by Dr Morton Gill in this same issue, and in skilled hands it is most useful There are certain areas of the stomach difficult to visualize, as around the cardia and sometimes in the pre-pyloric region of the lesser curvature, but when seen, the gastric carcinoma can be typical: quite an early stage The characteristic features are the undermined and rolled edge of the ulcer, the nodular appearance of its margins and the frequent oozing seen even during the examination Also it may be noticed that the peristaltic waves halt over the area of the stomach wall, infiltrated and made rigid by growth

Diagnostic medical treatment—Every effort should be made to establish diagnosis as early as possible by the above methods, for on this the success of surgical treatment depends There are occasions, however, when it is not desirable to submit an elderly patient to an exploratory laparotomy, especially when the gastric ulcer may be simple and not malignant In such cases, the effect of a short course of medical treatment may be invaluable confirmatory evidence With a simple peptic ulcer, the rapid relief of symptoms is usually striking when the patient is put to bed on two-hourly feeds, with alkali As a rule within a few days pain disappears later local and midline epigastric tenderness are no longer found and after two to three weeks the stools become free of occult blood When the

quence no longer holds, but pain and bleeding persist in spite of treatment, and especially when the X-ray deformity persists unchanged, then cancer must be strongly suspected. It is important not to be misled by the relief of pain and tenderness which occurs even in carcinomatous cases, discussed on page 231 in this article. In these the X-ray appearances may indicate some healing, with a diminution in size of the ulcer, but never a complete disappearance of the lesion. The importance of regular X-ray examination of a suspect deformity in the presence of symptomatic relief is obvious, and if the ulcer is in one of the regions of the stomach where malignancy is likely, nothing less than complete radiographic healing should be accepted as a sign that the condition has cleared.

CONCLUSIONS

Early diagnosis of cancer of the stomach is in the hands of the physician who recognizes the earlier symptoms. Unfortunately many patients do not seek advice until the growth is well advanced.

Certain broad principles should be borne in mind —

- (1) Cancer of the stomach is rarely met before forty years of age.
- (2) It may follow a long history of previous dyspepsia or may initiate digestive disturbances.
- (3) The prominent symptoms in its early diagnosis are flatulence and a sense of fullness after meals, often an ulcer syndrome with pain at regular intervals after meals, and a little later loss of appetite and loss of weight.
- (4) Anæmia is present in a moderate degree at an early stage.
- (5) Occult blood tests of the stools are inexpensive and give an important indication of alimentary bleeding: three successive negative findings will usually exclude carcinoma, but consistently positive results call for further investigation.
- (6) Fractional test meals give, in the main, curves of two types: the one shows little or no free HCl but a high total acidity, the other gives a curve indistinguishable from normal.
- (7) An early diagnosis is favoured by the occurrence of obstruction either at the cardia or the pylorus, but when occurring in the middle of the body of the stomach the growth may reach large dimensions before the patient seeks advice.
- (8) Other special investigations which aid diagnosis are one or a series of X-ray examinations and also gastroscopy.
- (9) Finally, the response to adequate medical treatment may aid, for when this latter fails, cancer is more than probable.

Thanks are due to members of the staff of the Charing Cross Hospital for permission to make use of the notes and X-ray pictures of patients under their care.

References

- Wasterman, G. B. (1942) *J. Amer. med. Ass.*, **118**, 1.
—, and Balfour, D. C. (1936) "The Stomach and Duodenum," New York.

more than a hæmatogenous gastritis which may or may not be due to the influenza virus

(b) As already mentioned, suppurative gastritis is exceedingly rare and, as it nearly always gives rise to a general peritonitis, it will usually require surgical treatment. Even so it is generally fatal

MORBID ANATOMY—Briefly the changes found in acute gastritis are those of any other acute inflammation with the addition of erosions of the mucosa, which are usually superficial and rarely penetrate into the submucous layers. The mucous layers are infiltrated with inflammatory cells and the vessels engorged. The gastroscopic appearances in acute secondary gastritis are little known as the patients are not in a condition to be submitted to examination. Some cases of acute primary gastritis have been so examined and hyperæmia with submucous hæmorrhages and thick mucous secretion have been observed

SYMPTOMS—Any disturbance of the gastric function which gives rise to discomfort causes epigastric symptoms. Discomfort in the mid- or lower abdomen is likely to be due to coincident disturbance of the small and large intestine respectively. The sensation may be no more than fullness or discomfort but may amount to pain. Tenderness will usually be present but is diffuse, although mainly situated in the upper abdomen. Vomiting is common but hæmatemesis, in spite of the presence of erosion and sub-mucous hæmorrhages, is rare. At first food is brought up but later the vomited material consists almost entirely of gastric juice, mucus and saliva. The acidity of the gastric juice tends to be low or absent and the vomit may even give an alkaline reaction from the mixture of mucus and saliva. In primary gastritis the constitutional symptoms will depend upon the severity of the irritation and also upon any toxic effects which the irritating factor may exert after absorption. There may be considerable prostration with headache, rise in temperature and tachycardia. In secondary gastritis the symptoms of the primary disease usually dominate the clinical picture

DIAGNOSIS—The acute onset, often related to an obvious indiscretion in diet or to the accidental or intentional ingestion of some irritating substance, may make the diagnosis relatively easy. But careful examination and a detailed history may be needed to exclude other acute abdominal conditions, such as cholecystitis, perforation, appendicitis, or lead colic. Leucocytosis may be present but it is rarely likely to be so severe as in acute infective or suppurative conditions. Certainly a definite diagnosis may be reached only by a process of exclusion and by the patient's reaction to treatment, for irritative primary gastritis rapidly improves with treatment and the acute symptoms rarely last more than two or three days. Probably the most difficult differential diagnosis is between acute gastritis of sudden onset and perforation of a peptic ulcer, as muscular guarding may be present in both. If there is serious doubt it is probably better to err on the side of diagnosing the condition for which surgery is indicated

TREATMENT—The main indication is to get rid of whatever it is that is causing the irritation. This will usually be achieved by the patient without assistance from his medical attendant but vomiting may be encouraged by giving copious draughts of a solution of sodium bicarbonate, 120 grains to the pint. If this should fail, the stomach can be washed out by tube with the same solution

As a rule, drugs are not indicated, but it is important to see that the bowels are active in cases in which constipation is a feature. No food should be given until the symptoms begin to subside but fluid is essential, especially if there has been much vomiting. If this continues for more than twelve hours a rectal saline-glucose should be administered, but in most cases it will suffice to give plenty of water by mouth. As soon as the vomiting has ceased diluted citrated milk can be started and the diet rapidly built up.

In *corrosive poisoning* the appropriate antidote should be administered and morphine may be required. Suppurative gastritis is usually fatal but if the condition localizes, operative treatment may be successful.

CHRONIC GASTRITIS

At the present time, especially in relation to the gastric disorders of men in the Services, chronic gastritis is a disease of the first importance. The thorough investigation which it has been possible to make in soldiers and sailors has shown how common the condition is, but there is no consistency of terminology or of classification. In the last twenty years or so the subject has been investigated from three different angles, namely, those of the radiologist, the pathologist, and the gastroscopist.

Since the introduction of a technique capable of displaying the pattern of the rugæ of the gastric mucosa on X-ray films, radiologists have recognized two principal variations from what is regarded as the normal. On the one hand the rugæ may appear greatly enlarged and thickened or, conversely, they may almost disappear. These two types have been called hypertrophic and atrophic gastritis respectively. That such conditions exist is generally confirmed by pathological and gastroscopic observations but it is not so universally agreed that the diagnosis can be confidently made by the radiological findings. For one thing the "rugosity" of the mucosa of the stomach is constantly changing and appears to be under the influence of emotion. The momentary finding of large thick rugæ, unless supported by other evidence of inflammation, is inconclusive, and the same applies to the apparent absence of rugæ on the X-ray film. From a study of stomachs resected at operation and material from autopsy, Faber (1935) described a chronic erosive gastritis associated with hyperacidity and a chronic diffuse atrophic gastritis associated with anacidity. As its name implied, the former was often found to be accompanied by multiple small erosions which were capable of giving rise to not inconsiderable hæmorrhages. Faber regarded this type of gastritis as the precursor of chronic peptic ulceration. A more detailed pathological classification, based entirely on histological findings, has been made by Keith Simpson but it has little value from the point of view of clinical diagnosis and treatment and need not be considered here.

Gastroscopic diagnosis has led Schindler to make a classification which has stood the test of twenty years and which fits in with the pathological classification of Faber. He recognizes four types—(i) Superficial gastritis, (ii) atrophic gastritis, (iii) hypertrophic gastritis, and (iv) gastritis of the post-operative stomach.

As the diagnosis of chronic gastritis can rarely be made except after gastroscopic examination it seems best to adopt the gastroscopic classification and this will be

TREATMENT—The principles of the dietetic treatment of chronic gastritis are the same as those for peptic ulcer. Meals must be small and frequent and their consistency completely non-irritating.

For superficial gastritis Schindler recommends complete rest in bed for eight days, with daily lavage of the stomach if there is much pus or mucus present. The benefits of lavage in gastritis are undoubted and I have used it successfully in quite a large number of soldiers. A recent case in which the treatment was unsuccessful was proved on gastroscopic examination to be a case of hypertrophic gastritis and the appearances were precisely the same after three weeks' treatment with lavage as they had been before treatment was started.

For the *hypertrophic form* a permanent post-ulcer regime, with complete abstinence from both tobacco and alcohol, should be instituted.

For *atrophic gastritis* the measures to be taken are slightly different. Although a bland diet is necessary there is no need for the strictness enjoined in the treatment of ulcer or the other forms of gastritis. Milk is best avoided, according to Schindler, and seasoning of food may be allowed. Hydrochloric acid is useful and often seems to give symptomatic relief. It is best administered as a beverage flavoured with fruit juice to be sipped after a meal, 60 to 120 minims of dilute hydrochloric acid (B.P.) may be used with up to 10 ounces of water.

For *post-operative gastritis* the best measure is the undoing of the gastro-enterostomy. If this is impossible for mechanical reason, or on account of the general condition of the patient, lavage may be used.

PROPHYLAXIS—There remains for consideration the prophylaxis of chronic gastritis. Comparatively little is known about the etiology of the various conditions described but there is general agreement that tobacco is a factor in the production of superficial gastritis as well as in peptic ulcer. Alcohol is also well known to be a cause of gastritis. There is little doubt that mechanical factors play a part and the irritation of improperly masticated food may be responsible for chronic as well as acute gastritis. The part played by bacterial infection from the mouth and upper respiratory passages is more open to doubt but it is always wise to advise the dyspeptic patient to have his teeth in good order and to have all septic foci removed. Moderation in smoking and drinking, punctuality and regularity of meals with not too long intervals between them, are important preventive measures. All these points should be insisted upon in patients who show the slightest predisposition to suffer from minor digestive upsets, for in this way the development of the more serious and resistant forms of gastritis may be discouraged.

References

- Faber, K (1935) "Gastritis and its Consequences," Oxford
 Hurst, A. F. (1941) "Text Book of Medicine," (Price, F.), 6th edition, Oxford
 Schindler, R. (1937) "Gastroscoy: The Endoscopic Study of Gastric Pathology," Chicago
 —, Ortmayer, M., and Renshaw, J. F. (1937) *J. Amer. med. Ass.*, 108, 465
 *Wolf, S., and Wolff, H. G. (1943) *Am. J. digest. Dis.*, 10, 23

*Note: The larger work, "Human Gastric Function" (Oxford University Press, 1943) is not yet available in this country.

GASTROSCOPY

By A MORTON GILL, M D, M R C P

Assistant Physician, West London Hospital, Physician, Emergency Medical Service

THERE are few cavities in the human body into which the curious have not tried to pry, and the stomach is no exception, for various attempts at gastroscopy have been made during the last eighty years, a start being made with a professional word-swallower, who declined the honour after viewing the instrument, remarking that swords and not trumpets were his *métier*. The early instruments failed because illumination was so poor, the later ones, although widely used in Germany, were condemned in this country, because with the rigid tubes perforation of the lower œsophagus and greater curve of the stomach was not infrequent.

However, with the introduction in 1932 by Rudolf Schindler of the flexible gastroscope a new era opened, for this instrument was safe, easy to introduce, less uncomfortable to the patient than most of the other endoscopes and gave excellent vision. Its chief defect lay in the fact that, since the flexible tip could not be directed by the operator, certain parts of the stomach, notably the roof or lesser curve of the pyloric antrum, frequently the site of ulcers, could not always be brought into view. Some two years ago Hermon Taylor's instrument, manufactured in this country, constituted a great advance, giving controllable flexibility and thus allowing inspection of the whole stomach in all cases and enabling a lesion to be seen in focus and at close view as desired. A biopsy attachment to the flexible instrument is in use in America, but it is not without risk of producing hæmorrhage and the piece of tissue removed is so small and macerated that its value is doubtful. Photography has been possible for some years but awaits the cessation of hostilities and the release of fast colour film in sufficient quantity to become universal.

PROCEDURE

The method of gastroscopy, originally unnecessarily complicated, has tended to become simplified with the passage of time, the increasing numbers of patients examined and the realization that the passage of the instrument presents no difficulty in the vast majority of cases. [The examination can be performed at any time of the day provided that the patient has taken nothing by mouth for six hours previously. Morphine ($\frac{1}{4}$ of a grain) is given hypodermically one hour before instrumentation and 1 tablet ($1\frac{1}{2}$ grains) of anethaine is sucked in the mouth until dissolved, twenty minutes before the patient is brought to the theatre. Although specially designed tables are available, these are not necessary and any standard theatre table is adequate: a back-rest can be attached to this and adds to the patient's comfort. With the patient lying on his left side, hips and knees flexed and a nurse supporting the head, the operator introduces the index finger of his left hand into the patient's mouth, feels for and hooks forward the epiglottis, while with his

right hand he passes the flexible tip of the gastroscope into the posterior pharynx and so down the œsophagus. Passage of the instrument is eased if it has been previously lubricated with K-Y jelly, glycerin, liquid paraffin or water. Only gentle pressure should be exerted, for the œsophageal mucosa is friable and easily injured. A slight increase of resistance is felt as the tip reaches and passes through the cardiac orifice into the stomach.]

The above method is subject to modification in a minority of cases. [If pyloric obstruction is suspected or known to be present, complete aspiration of the gastric contents by means of a Ryle's tube should be carried out half an hour before examination. Atropine 1/100 or a grain or hyoscine 1/150 of a grain is given as a routine with the morphine by many gastroscopists, but excessive gastric secretion never obscures vision and these drugs tend to reduce gastric motility so much that a clear view of the pyloric ring and pre-pyloric region cannot be obtained. Rarely, the introduction of the operator's index finger produces retching, indicating inadequate local anaesthesia. In such cases a gargle of 2 c.cm. of 2 per cent. decaine should be given in addition to the tablet. It is not always possible to reach the epiglottis with the index finger, and when this is so, the tip of the instrument having been passed into the posterior pharynx, the patient should be asked to swallow, when it will be found that the gastroscope slips smoothly down the œsophagus. Occasionally, owing to failure of relaxation of the cardia, the tip may be held up in the lower œsophagus. In this eventuality, patience is required, since relaxation will almost always occur within a matter of ten minutes. Strong pressure must never be used. The inhalation of a capsule of amyl nitrite will frequently induce relaxation in difficult cases. In particularly nervous patients a general anaesthetic is sometimes necessary, using a basal narcotic, followed by inhalation anaesthesia. In such cases the preliminary medication must not be omitted.]

Orientation—A few puffs of air will distend the stomach sufficiently to allow inspection of the mucosa and, with the patient in the position described, the lesser curve is seen with the lens directed towards 12 o'clock, the greater curve being brought into view by rotation through 180 degrees, so that the lens points towards 6 o'clock. A small pool of clear translucent mucus is seen collected here. The anterior wall is on the operator's left, the posterior wall on his right. In the fasting stomach, the pyloric antrum is usually deflated, the entrance to the antrum, at the incisura angularis, being indicated by a series of converging folds. These can be parted by the introduction of more air, when the tip of the gastroscope can be flexed, allowing the lens to move into a position where the pylorus and antrum become visible. After the whole of the antrum and the pyloric ring opening with each peristaltic wave have been viewed, the body and fundus should be examined methodically by withdrawing the instrument and rotating constantly in order to inspect the mucosa of the anterior and posterior walls of the lesser and greater curves. The cardia can be seen as the instrument is finally withdrawn. The whole examination, including introduction, does not average more than ten minutes, though special cases may take up to twenty to thirty minutes. For example, those in which it is required to study the secretory activity of the mucosa by watching the excretion of neutral red or the effects of histamine or insulin.]

Normal appearances—The normal mucosa of the stomach is described as being of an orange-red colour, the colour being light when the mucosa is in a resting state and becoming heightened and distinctly hyperæmic as local vasodilatation occurs when secretion has been stimulated, for example, after the parenteral administration of histamine or insulin, after the ingestion of concentrated meat extract and during the digestion of a meal. Emotion also produces alteration in the colour of the mucosa, with fear, pallor follows local vasoconstriction, where excitement and anxiety induce vasodilation and increased reddening. The mucosa is thrown into folds or rugæ, which run longitudinally and are especially large and profuse along the greater curve. These folds tend to flatten somewhat as the instrument is introduced during the course of the examination but, if normal, they cannot be completely obliterated by air distension of the stomach. Apart from its colour and pattern of folds, the normal mucosa presents a glistening shiny surface, due

the fact that it is everywhere covered by a thin protective layer of clear translucent mucus. When actively secreting, the mucosa, in addition to its heightened colour, secretes a clear fluid which forms rivulets between the folds, trickling down to collect in a pool in the dependent portion of the stomach—with the subject lying on his left side, this pool forms on the greater curve of the body and fundus. The stomach is never still, it moves with respiration, transmitted arterial pulsation is often seen and frequent vigorous peristaltic waves are constantly occurring, being especially well marked in the antrum and causing the pylorus to open. Gastric motility is greatly increased by drugs which stimulate secretion, such as histamine and insulin, whilst the inhibitors, belladonna, atropine and hyoscine, also inhibit peristalsis to a greater or lesser extent.

INDICATIONS FOR GASTROSCOPY

At the present time it may be said that there are four major reasons for using this method of investigation—for purposes of research, the elucidation of chronic dyspepsia, the diagnosis of unexplained gastric hæmorrhage and the examination of patients prior to and after operations on the stomach.

(A) *Research*—The gastroscope has proved of value in the study of the normal physiology of the stomach, first in relation to the normal colour of the mucosa and its physiological variants in response to food and emotion, indicating the presence of local vasodilatation or constriction. Further control is obtained by using a thermo-couple to measure amount and rate of the blood flow. Secondly, in conjunction with test meals of various types and estimations of gastric juice for volume, acid concentration and peptic activity after stimulation of secretion, gastroscopy gives visual confirmation of the effects of such stimulation on the mucosa. Thirdly, motility can be gauged visually by gastroscopy, in addition to the usual balloon method of recording. Lastly, the study of the fold pattern is complementary to that in use by radiologists working with barium.

(B) *Dyspepsia*—In the elucidation of chronic dyspepsia, gastroscopy should be considered as being complementary to radiology, and it is particularly in those cases in which the X-ray findings are negative or inconclusive that help may be obtained. Moreover, apart from the initial cost of the instrument, gastroscopy is infinitely less expensive than a barium meal, its main disadvantage being that at present no permanent pictorial record of the findings is possible. It may be of value to consider the different lesions in some detail—

(1) Most chronic ulcers of the stomach are demonstrable radiologically but some are not, particularly those in which the crater is either shallow or very small, especially if situated on the lesser curve immediately above the angulus. In my own series, 17 per cent. of all chronic gastric ulcers were invisible on X-ray examination. Thus there is a place for gastroscopy when strong clinical grounds exist for considering a gastric ulcer to be present and yet confirmation is lacking by X-ray. An equally important use for gastroscopy in ulcer is for confirmation of healing, for it has been shown that an active ulcer exists for a period of a week or two after the X-ray appearances are those of complete healing. In other words, if recurrences due to incomplete healing and the premature return of the patient

to full activity are to be prevented, gastroscopic proof of healing, with epithelialization of the scar, is necessary

(2) Multiple small superficial erosions of the gastric mucosa, which the Wolffs have seen develop into chronic peptic ulcer, can only quite exceptionally be demonstrated radiologically and yet if, as seems likely, these are the immediate precursors of ulcer, it is of considerable importance that they should be diagnosed, especially as they quickly respond to treatment along ulcer lines and heal within a week or ten days

(3) The gastroscope is being used ever more widely in the diagnosis or exclusion of carcinoma of the stomach. Its use lies not only in the case in which the X-ray findings are suggestive but not conclusive, thus saving the patient an unnecessary laparotomy or alternatively further delay, but also in the case in which X-ray is negative, since the small nodule of early malignancy may be clearly seen by gastroscopy but fail to produce a filling defect with barium

(4) Hurst has remarked that, just as no one would diagnose tonsillitis without looking at the tonsils, so a diagnosis of colitis requires confirmation by sigmoidoscopy. In the same way chronic gastritis, which may be suspected on clinical grounds and have suggestive evidence as a result of test-meal and X-ray examination, should whenever possible receive that further confirmation offered by visual examination of the gastric mucosa. This is advisable so that accuracy in diagnosis may be attained, the extent and type of gastritis present be determined, and in order that the effect of treatment can be followed. Chronic gastritis has been classified by Schindler into three types, superficial, hypertrophic, and atrophic and histological evidence, based on specimens obtained at operation, exists for this delineation. It is not known if these types represent distinct disease entities or if, as would appear more likely, they are different phases of a continuous pathological change. Certainly there are many recorded instances of an atrophic lesion developing out of a hypertrophic, transient superficial changes are often seen occurring as a superimposition on chronic atrophic and hypertrophic types and it is also not uncommon to see patchy atrophic and hypertrophic areas existing side by side in the same stomach. Of the three types or phases, the superficial is the most common and shows simply the changes seen in any mucosa which is inflamed—congestion, œdema, submucous hæmorrhages, thick adherent streaks of mucus and, in the more severe degrees, shallow superficial ulcerations. As in the case of ulcer, under efficient treatment the patient's symptoms clear long before the lesions heal and some are highly resistant to treatment, but in the majority of cases the mucosa returns to its normal healthy state within four to six weeks. The same cannot be said of the hypertrophic and atrophic forms of chronic gastritis, which would seem usually to be the result of permanent pathological changes in the mucosa and submucosa, not necessarily inflammatory in origin. Thus, one of the best examples of a permanent mucosal atrophy is seen in cases of pernicious anæmia, when gastroscopy reveals a diffuse atrophy, the mucosa being thin, the folds absent or scanty, the normal colour lost and replaced by a greenish yellow background with a fine network of submucosal blood vessels clearly visible, resembling somewhat the normal retina as seen by ophthalmoscopy. Such changes, whether diffuse or patchy, are also found existing without anæmia and

Although most are permanent, it is claimed that a few return to normal under treatment with liver or stomach extract. Certainly, in many of these cases the mucosa remains permanently atrophic, secreting little or no acid and pepsin, and the patient's dyspepsia is only relieved by strict attention to diet, a return of symptoms accompanying any indiscretion. It is not surprising that such individuals are frequently labelled as functional or neurotic dyspeptics, whereas in truth they possess stomachs the secretory activities of which are grossly impaired. The hypertrophic cases, on the other hand, are difficult to assess, for although, as has been said, histological confirmation of this condition is available in plenty, it is also true that on one visual examination alone it may not be possible to say whether the hypertrophy represents a constitutional change, a transient emotional reaction, or an inflammatory state. So it is that hypertrophic gastritis has become the subject of controversy and its frequency is in dispute. Its existence cannot be denied nor its association with chronic ulcer, especially of the duodenum, together with a hypersecreting stomach, pouring out a highly concentrated acid juice rich in pepsin. In a fully-developed case the appearances at gastroscopy are characteristic, the rugæ being large and tortuous, the fold pattern broken up to form cobble-stone areas and even, in the advanced cases, resembling sessile polyps (so-called gastritis pseudo-polyposa). As a result of fibrotic changes the folds are stiff and do not flatten with air distension of the stomach, whilst the mucosa itself has a velvet or sponge-like appearance. Its colour is usually deepened.

(5) Other lesions, of greater rarity, are also found on occasion and explain an otherwise obscure dyspepsia—syphilitic ulcers, single benign tumours, liable to ulcerate and bleed, and malignant tumours other than carcinoma.

(c) *Gastric hæmorrhage*—The medical profession is indebted to Avery Jones for his careful gastroscopic study of hæmatemesis and his finding of acute ulcers of all sizes, single and multiple, in a majority of cases, within a week of hæmorrhage, the X-ray findings being negative. Thus it is known that, although it is neither advisable nor safe to gastroscope all patients who have suffered dangerous hæmorrhage from the stomach until their condition permits, it will nevertheless be found that an ulcer is responsible for the occurrence in most cases and that such ulcers tend to heal with great rapidity.

(d) *Gastric operations*—Owing to the high incidence of stomach and jejunal ulceration following gastrojejunostomy, this operation is not performed with the frequency and enthusiasm of an earlier day and the same complication, although less frequent, is not unknown following partial gastrectomy. It is to be expected that, along with estimation of the secretory capability and peptic activity of any given stomach, gastroscopy, by ascertaining the type of mucosa present, will play its part in the guidance of the surgeon as to which operation should be performed in a particular case, and the chances of his work being ruined by the development of such post-operative complications. Meanwhile, in the elucidation of post-operative dyspepsia, gastroscopy is of considerable value, inasmuch as many of the lesions fail to be demonstrated by other means. Those of special importance and frequency are post-operative gastritis, usually of superficial type and responsive to treatment, erosions at the stoma, and peptic ulcer on the anastomosis or actually in the jejunum.

CONTRAINDICATIONS

There are certain cases in which gastroscopy should not be attempted, because the procedure would be either not without risk or entirely unprofitable. Examples of the first are —

- (1) Recent infection of the upper respiratory tract
- (2) Œsophageal lesions—varices, stenosis, neoplasm
- (3) Aortic aneurysm
- (4) Any illness with high fever or producing marked debility

The second group includes gross kyphoscoliosis and individuals with a rigid spinal column, making introduction of the gastroscope impossible or, if introduced, allowing of a hopelessly distorted view

COMPLICATIONS

It is so common for the patient to find his throat sore for a matter of twenty to forty-eight hours after gastroscopy that this hardly merits the term complication—the routine use of a simple gargle for a day or two is of value.

A rarer and potentially serious lesion is an œsophageal abrasion, which results if undue pressure is exerted during the introduction of the instrument, especially if there is spasm or the patient is excitable and fails to keep still. The development should be suspected if the above pertain, the patient finds his throat to be extremely sore and accompanied by dysphagia, while at the same time becomes febrile. In most cases a polymorphonuclear leucocytosis occurs and unless the process is arrested, a para-œsophageal abscess, requiring surgical drainage, will result. Treatment consists in confining the patient to bed, giving boiled liquids only, by mouth, and a full course of sulphathiazole. The results are excellent, rapid resolution of all symptoms and signs occurring within a few days.

The most serious, and happily rarest complication of gastroscopy, is perforation of the lower end of the œsophagus or greater curve of the stomach by the tip of the instrument. The condition should be recognized immediately, for it is for impossible to distend the stomach with air and obtain a view, whilst X-rays taken with the patient erect, show the presence of air under both cupola of the diaphragm. Treatment is immediate laparotomy, with suture of the perforation or drainage without suture if the perforation cannot be reached, and the results are surprisingly good. Thus, in a series of over 20,000 gastroscopic examinations there were eight perforations, of which two, both œsophageal, proved fatal, the remainder making a complete recovery.

SUMMARY

The development of the modern flexible gastroscope is briefly outlined, together with technique of usage, indications for and value of the examination, contraindications to and possible complications of instrumentation

DIGESTION IN DISEASES OF THE NERVOUS SYSTEM

BY A. W. HENDRY, O.B.E., M.D., F.R.C.P.

Lecturer in Clinical Medicine, Aberdeen University, Physician, Royal Infirmary, Aberdeen

ANATOMICALLY, in the stomach, as in other parts of the gastro-intestinal tract, there are two nervous mechanisms —

(A) *The intrinsic mechanism* contains the plexuses of Auerbach and Meissner. Bohr (1934) considers, however, that in the synaptic mesh there is also a true mycytial network sending fibres to the muscles. This mechanism works primarily through local intrinsic reflexes, and its main function is coordination of muscular action. It carries on when all extrinsic nerves are cut; indeed then peristalsis becomes too active. The stomach is really autonomous, probably the nature and amount of gastric contents constitute the stimulus for myenteric reflexes, and it would seem appropriate to recall the words of an early Edinburgh physician Whytt, 1751) "The distension of the hollow muscle has a remarkable influence towards exciting it to action." Surely this is the first mention of what moderns now as "adequate stimulus." The stomach is also affected reflexly through complicated neural connexions with other viscera, thus dyspepsias may result from a diseased appendix or cholelithiasis.

(B) *The extrinsic mechanism* — Normally, the fibres of the extrinsic system connect up with, modify and, in a general way, control the actions of the intrinsic nerves. The extrinsic nerves are the vagus (parasympathetic), and the splanchnics (sympathetic). These nerves have their higher centres in the diencephalon, where the parasympathetic group is located in the tuber-ventricular nucleus, the sympathetic group posteriorly, whilst the anterior supra-optic group influences both centres (Beattie, 1935). Fibres from these nuclei enter the pituitary, so that the diencephalon really constitutes the headquarters of the neuro-endocrine system (Roussy and Mosinger, 1933). Furthermore, parasympathetic centres have connexions with important subsidiary nuclei in the midbrain and medulla, and from the latter springs the vagus nerve, carrying parasympathetic fibres to the stomach. Only the effector part of this mechanism is indicated, but there are of course many "visceral afferents." Although similar to the ordinary sensory somatic nerves, the "visceral afferents" are nevertheless functioning afferents of the autonomic mechanism. The sympathetic supply to the stomach is delivered mainly by the splanchnic nerves. These two groups, the sympathetic and parasympathetic, belong to the autonomic system and, as first conceived by Gaskell in 1886, have opposing functions. It is considered that in the stomach, stimulation of the parasympathetic centres produces peristalsis, vasodilatation and secretion, whereas sympathetic stimulation produces stasis and vasoconstriction, with

inhibition of gastric secretion (Beattie, 1932, Cushing, 1932). In truth, however, this has never been demonstrated satisfactorily, probably because of the complicated union of these nerves with the myenteric plexuses, and because each extrinsic nerve carries impulses from both centres. Nevertheless, the vago-sympathetic antagonism is quite clear and definite if the autonomic centres themselves are considered (White and Smithwick, 1942). If all extrinsic nerves were eliminated from the alimentary tract there would follow marked increase of the peristaltic movements, resulting in diarrhoea, and probably death from inanition. The parasympathetic appears to produce conditions suitable for the digestion and absorption of food. It builds up energy, hence its main purpose is anabolic activity. The sympathetic stops digestion, it mobilizes blood in the muscles, it produces a body ready for action. The parasympathetic collects potential, the sympathetic provides conditions suitable for conversion of potential into kinetic energy. The diencephalon is controlled largely by bodily states, somatic requirements and mental conditions, it receives afferent fibres from the thalamus and cortex, as well as from the viscera. Normally, the autonomic, through the neuro-endocrine system, controls the "internal milieu" of the body. In health, digestive activities work smoothly, harmoniously, and almost unconsciously. Fortunate people do not even know they have a stomach, but its function may be upset by many factors. Willis, in 1664, conceived that the function of the visceral system was to place the heart and viscera in connexion with the brain, so that they could work in harmony. More recently, Cannon (1932) has elaborated the concept, and termed it homeostasis.

In addition to the diencephalic autonomic nuclei, there exists a cortical autonomic centre situated in the pre-motor cortex (Hoff and Green, 1937). This centre influences the diencephalon through mental percepts and concepts. Savoury odours produce a "psychic juice," whereas disgusting sights cause anorexia, nausea and vomiting. Emotions markedly affect digestion. All pleasant emotions, mental ease and soft music, are good stomachics, whereas unpleasant emotions, fear, anxiety, worry or weariness, inhibit digestion and may produce dyspepsia.

It will be appreciated that there are many possible causes for disharmony in gastric function. Gross disease of the nervous system, tumours, inflammation, degenerations or vascular lesions, may cause upset in cerebral and neuro-endocrine systems, with consequent upset of digestion. Emotionalism may upset the diencephalon, or the whole nervous system may be affected through fatigue, strain or frustration. In the absence of mental upset, there may be a constitutional instability of the autonomic itself, which makes for lack of integration, incoordination and disharmony. Both its mechanisms may be hypotonic or hypertonic, or there may be an imbalance, with consequent upset of visceral function.

This brief summary of the gastric nerve supply and function suggests a classification of the dyspepsias associated with nervous disorders —

- (1) Dyspepsias due to organic disease of the nervous system
- (2) Dyspepsias due to functional disease of the nervous system
- (3) Dyspepsias due to essential autonomic disorders

DYSPEPSIAS ASSOCIATED WITH ORGANIC DISEASE OF THE NERVOUS SYSTEM

In diseases of the nervous system, dyspepsias may form part of the symptomatology. These dyspepsias may be classified in the following manner—

- (a) Vomiting due to severe cerebral disturbance
- (b) Dyspepsias associated with disease of the autonomic centres
- (c) Dyspepsias due to disorders of the nerves or their plexuses

In the first group may be placed cases of cerebral tumour, with increased intracranial pressure, in which headache, vomiting and optic neuritis form the classical syndrome. In concussion, vomiting often takes place, indeed it sometimes helps to establish evidence for the concussion state. Frequently, giddiness, headache and vomiting are the initial symptoms of apoplexy. Dyspepsias and even peptic ulcers occur in cerebral birth injuries, in meningitis, but chiefly in tumours of the third and fourth ventricles.

In the second group, it is often noted that tumours, vascular degenerations or inflammatory changes about the diencephalon cause dyspepsia. Beattie has produced ulcer dyspepsia by stimulation of the tuber region of the hypothalamus. In medullary syndromes, vomiting is sometimes severe, and every physician recalls cases in which vomiting was the only symptom until later neurological signs indicated the nature of the malady.

In the third group, it is not quite clear how many dyspepsias can be attributed to the nerves themselves, but tabetic crisis is probably due to an abnormality in the visceral afferents, for antero-lateral cordotomy relieves it (Kahn and Barney, 1937). In this group also may be placed some types of spasmophilic disorders, such as achalasia at the lower end of the œsophagus. This is usually remedied by the passage of special bougies. Knight (1935) and Meade (1939) have reported only moderate relief of the condition by sympathectomy. There are other cases of cardiospasm, in which the only pathological findings were diminution or absence of neurones in the segment, which does not relax (Alvarez, 1939).

DYSPEPSIAS ASSOCIATED WITH FUNCTIONAL NERVOUS DISORDERS

This is a nervous indigestion, properly so called, and it constitutes a large group, which exhibits a varied symptomatology, mostly uncomfortable sensations which follow eating. Such symptoms may be heaviness, burning in the epigastric region, or distension of the stomach with gas, vomiting or regurgitation of food, and many general symptoms, such as palpitation, restlessness, insomnia, and so on. These symptoms do not make a diagnosis, but suggest careful consideration of the condition, mental and physical, and it should be kept in mind while so doing that the stomach is a sensitive indicator of emotional states. Purely nervous dyspepsia is the definite result of an upset mental state resulting in autonomic disharmony and dyspepsia.

There are two main groups of nervous dyspepsia corresponding in a general way to the extrovert and introvert type of personality, or, if preferred, to the pyknic and leptosomatic builds.

- (a) *The hypertonic stomach*—Here, there is hypermotility and usually hyperacidity, which give rise to heartburn. The hypermotility appears at the cardiac

end of the stomach, giving rise to a feeling of constriction, which the patient endeavours to relieve by eructations. Perhaps he swallows air in order to distend the stomach, and so relieve the condition by eructation, or he may take bicarbonate of soda. If the spasm occurs at the pylorus, it suggests peptic ulcer. Indeed this type of hypertonic stomach may be the initial phase of a subsequent peptic ulcer, to be discussed later.

The patient with the hypertonic stomach is usually of an active, alert disposition, and if he becomes mentally upset, then the hypertonic type of dyspepsia is likely to manifest itself through overaction of the parasympathetic.

(b) *The asthenic stomach*—Here, the picture is different. The patient is of a different build. Motility and tone of the stomach are low, as usually is acid formation. The appetite is poor. After a meal there is heaviness, nausea, and frequently splashing in the gastric region. Digestion is slowed down, and vomiting may follow, with relief of discomfort. The patient is not often of a robust constitution. He has a low blood pressure, is easily tired, and is frequently anxious and introvert.

In both types, two points should be noted—

(i) Many people have such physical phenomena in gastric functions but do not complain of any dyspepsia. There must therefore be another factor, and this is the irritable sensorium of the nervous individual.

(ii) In either group, the patient tends to become a food fadist, and may perhaps starve himself in order to avoid the discomfort after eating.

To these two main groups of dyspepsia must be added mixed types. Some of these may be associated with overaction of both sections of the autonomic system (amphotonia), and others to weakness of both groups.

THE MANAGEMENT OF NERVOUS DYSPEPSIA is not a simple affair. It requires thought, tact and time. Each patient must be given individual consideration, for the method of attack varies with each patient.

(1) *Investigation of the nervous state*—Symptoms must be carefully noted and analysed. Frequently, early in the anamnesis, evidence of a nervous state will become apparent. Past illnesses are ascertained, and in every case careful systematic inquiries are made about many matters, e.g., work and any worries connected therewith, financial state, home circumstances, food, the time spent at meals, relaxation and recreation. Knowledge of the patient's ambitions, disappointments, difficulties and fears, are of special importance. The answers to these queries make it possible to estimate the patient's mental make-up and, with experience, his personality may be readily and truly assessed.

(2) *Investigation of the gastric state*—This should include examination of all systems. In many cases clinical examination will be followed by radiological investigation, and often by chemical examination of the gastric juices and stools. These special measures are useful, not only in establishing a diagnosis, but the reports are also of great therapeutic value. In nervous dyspepsia investigation will reveal an emotional disturbance, followed by dyspepsia.

PRINCIPLES IN THE TREATMENT OF NERVOUS DYSPEPSIA—Efforts are directed towards correcting the neurosis and bringing about normal digestion. The diet should be soft, plain, good, and mixed, and should contain adequate

quantities of necessary foodstuffs and vitamins. In hypertonic cases it should not be stimulating, and it should not be tiresome, whereas in hypotonic types the diet should stimulate appetite and gastric secretion. In all cases meals should be properly cooked and daintily served, and it is of immense importance that the patient allow himself sufficient time at table. The dining hour is not a time for solving business problems. Inculcate habits of sound living, and make certain that adequate sleep, relaxation and exercise are taken.

With regard to the neurosis, difficulties should be frankly and freely discussed, for many troubles disappear in the light of full examination. The patient's troubles should be predigested and presented to him in an acceptable form. His ideas of values should be corrected, and a sound philosophy of life encouraged. Mental help is a powerful therapy, indeed the main remedy in nervous dyspepsia.

Sleeplessness may be relieved by a little luminal or bromide. Alkalis are indicated in hyperacidity, whilst stomachics, abdominal massage, or even abdominal supports should be considered in hypotonic types.

These are principles. A very readable, excellent and detailed account of treatment is to be found in Alvarez's "Nervous Indigestion" (1939).

The results of adequate early treatment are excellent, but later cases may have developed organic troubles, such as ulcer, and these are not so easily dealt with.

DYSPEPSIAS ASSOCIATED WITH ESSENTIAL AUTONOMIC DISORDERS

There are innumerable cases of dyspepsia and peptic ulceration which result from autonomic disorder occurring in the absence of any other disorder or disease. They are due essentially to dysfunction of the autonomic system, which usually works smoothly and efficiently, but when it does go wrong, there is upset in the "inner environment." Some people inherit a tendency to autonomic imbalance. After a day's work, the sympathetic system has suffered loss, and parasympathetic hyperactivity shows itself in asthma, dyspepsia or colitis. It may well be that the nerve gradients to certain viscera are constitutionally abnormal. The pathway to the pulmonary viscera may be wider than the pathway to the stomach or colon. In other words, the gradients vary with different people, and in different circumstances, hence some get asthma, some dyspepsia and some colitis. Many stable people complain of symptoms identical with those of the hypertonic stomach. Ulcer is suspected, but radiological and chemical evidence is absent. Gastroscopic examination shows redness and irritability. Fractional test meal shows hyperchlorhydria. This condition is sometimes termed the pre-ulcer or pseudo-ulcer stage. Some clear up, but others go on with recurring episodes, until an ulcer becomes demonstrable. Initially, such cases are precisely similar to those of nervous dyspepsia, but in this latter there is difficulty in adaptation to external environment with consequent disharmony, whereas in autonomic dyspepsia the trouble is essentially and primarily a functional disorder of the autonomic nervous system. Ordinarily, feelings and desires associated with discriminative thought end in action, but too frequently in the present state of civilization action is static, and if the organism is not adapted to static action there results autonomic disharmony.

A Brooklands racing model does not make a good stationary engine. It is

a fact that many alert, active, extrovert people, who are engaged in sedentary work, suffer from a peptic ulcer. Machinemen, bus drivers, and chauffeurs, frequently suffer. Introverts do not suffer in this way, for they are more attuned to static action. In these matters only plausible explanations are yet possible. May it not be that the urge to action produces stimulation of the adrenergic nerve resulting in the production of adrenaline, which pours into the blood? Static action does not require adrenaline, and the method of its disposal is not established. Its action may be shunted to the stomach, where it lessens blood supply. Again while we eat we work, and when we eat we take food of the most appetizing type. This calls the gastric juices into action. Thus, we have amphotonia with spasmodic contraction of the gastric mucosa, local spasm of the terminal vessels and hypersecretion. Small areas are devitalized and acted on, with the result of irritation, and if the condition be prolonged, peptic ulceration. Recent work would tend to support this. Mann and Bollmann (1932) showed that prolonged exposure of the stomach to free acid produced irritation, inflammation and ulceration.

In these days of machines and motor cars, when people stand or sit and think but use their muscles very little, the results may be disastrous. An intention which has no outlet through muscle action may make other organs suffer. The neuro-endocrine system of extroverts is tuned to muscular activity, and predisposed to disharmony by the absence of it. Autonomic dyspepsia may be determined by static action, and aggravated by stimulating foods. Peptic ulcer may result from a too fine adjustment to an environment which does not require muscular activity. Indeed Elton of Oxford (1941) points out that it does not always pay to be too well adapted. The business man may win the struggle for cash, but may ruin his health in so doing. Here it is pertinent to quote R. H. Tawney ("Sickness in an Acquisitive Society") "This obsession by economic issues . . . is a poison which inflames every trivial scratch into a malignant ulcer." It is reasonable to consider that peptic ulcer is a "somatic modification" resulting from the "acids of modernity."

For the man of action the tyranny of industrialization and the paralyzing effect of machines and engines result in a static life which will jeopardize his health. The writing is on the wall, and the Atlantic Charter will not cure the malady.

References

- Alvarez, W. C. (1939) "Gastro-enterology," New York, 286.
 Beattie, J. (1932) *Canad med Ass J*, 26, 278.
 — (1935) *Brit J Surg*, 23, 440.
 Cannon, W. B. (1932) "The Wisdom of the Body," New York.
 Cushing, H. (1932) *Surg Gynec Obstet*, 55, 1.
 Elton (quoted by J. B. S. Haldane) (1941) "Science and Everyday Life," London, 8.
 Hoff, E. C., and Green, H. D. (1937) *Amer J Physiol*, 118, 641.
 Kahn, E. A., and Barney, B. F. (1937) *Arch Neurol Psychiat*, 38, 467.
 Knight, G. C. (1935) *Brit J Surg*, 22, 864.
 Mann, F. C., and Bollmann, J. L. (1932). *J Amer med Ass*, 99, 1576.
 Meade, H. S. (1939) *Irish J med Sci*, 99, 130.
 Roussy, G., and Mosinger, M. (1933) *Ann Med*, 33, 301.
 Stohr, P., Jun. (1934) *Z Zellforsch*, 21, 243.
 White, J. C., and Smithwick, R. H. (1942) "The Autonomic Nervous System," London 357.
 Whytt, R. (1751) "An Essay in the Vital and Other Involuntary Motions of Animals," Edinburgh.

THE PSYCHOLOGICAL ASPECTS OF INDIGESTION

By AUBREY LEWIS, M.D., F.R.C.P.

Clinical Director and Lecturer in Psychiatry, Maudsley Hospital, Consultant in Psychological Medicine, British Postgraduate Hospital

THE psychological aspects of indigestion are most often considered as ways in which emotion, especially unpleasant emotion, can influence gastric and duodenal action for the worse. Recent experimental observations on human beings illustrate the problem better than the numerous animal experiments carried out by Pavlov, Cannon, and others following in their footsteps who studied the visceral manifestations of emotion.

Twenty-six people with peptic ulcer, gastritis or duodenitis, and thirteen people free from any gastro-intestinal disturbance were purposely made, while fasting, to experience agreeable emotion, these feelings were aroused by talking to them about topics known to be painful and provocative to them. The characteristic changes observed while the subject was feeling resentment, anxiety, guilt or frustration, thus deliberately induced, were increased secretion of free HCl, and continuous active peristalsis instead of the milder nodic peristalsis that occurs during contentment and emotional quiescence. These changes occurred in all the dyspeptics and in half of the normal people, but they were more intense and lasting among the former. Often epigastric discomfort was experienced when the patient was angry or anxious, at the same time as his peristaltic activity and free HCl secretion increased. In a patient with duodenal ulcer, hæmorrhage also occurred when he was made angry, as was indicated by bright fresh blood in the gastric contents.

Since it is possible to demonstrate in many persons with peptic ulcer that they have felt long-standing anxiety, resentment, guilt or frustration, and since hyperchlorhydria is, by general consent, the common and possibly essential physiological feature of peptic ulcer, it has been concluded that baneful emotions contribute to the changes in function that cause dyspepsia and perhaps lead to tissue changes in patients with ulcer. There are weaknesses in this argument. Some observers, for instance, have noticed in man, and in other animals, that fear and rage may be accompanied by reduced peristalsis and HCl output. This occurred in only about half of the normal group referred to, but not at all in subjects with ulcer or gastritis. It may be that, like Pavlov's dogs, people can be divided into types, one of which, the aggressive, their salivary and gastric secretion rises during and under stress, whereas in the other, made up of the timid and inactive, it falls, those with proneness to a rise are those prone to develop dyspepsia and ulcer.

Further questions then arise. What evidence is there of constitutional predisposition, and what is the mechanism whereby emotional upheavals can bring about the observed disturbance of gastric function?

THE "ULCER CONSTITUTION"

Constitutional predisposition has been studied and alleged to be recognizable in the physique, family history, and physiological peculiarities of the patient with peptic ulcer: the familiar fluctuations and recurrences of the illness, and the greater susceptibility of some races are also invoked as evidence. But more frequently than these signs of constitutional habit the peculiarities of temperament have been stressed: patients with ulcer are rarely casual and lethargic, they are

often—some would say, as a rule—highly-strung, determined people, conscientious, ambitious and active, driving themselves in an effort to attain a perhaps unattainable standard. It would be foolish, of course, to maintain that all ulcer patients exhibit such traits or even that such traits are known to be more frequent among them than among, say, a section of people holding responsible positions for which there is keen competition. Nor is it necessary that the man with these traits should wear them on his sleeve, he may worry but preserve outward calm, feel resentful or alarmed but look self-possessed. The bulk of observations go further than to indicate that on retrospective inquiry a considerable number of patients with peptic ulcer report that they have been of a worrying, driving disposition, emotionally responsive and seldom content to be still.

EMOTIONAL FACTORS

The mechanism whereby the emotional peculiarities may be linked with the gastric changes in these patients is usually assumed to be autonomic, and some insist that vagotonia is a frequent and characteristic finding in peptic ulcer. To the last opinion there are objections, it is probably unsafe to go further than to assume a labile autonomic nervous system in these patients. It has been possible in animals to produce experimental ulcers by lesions in the brain stem, prolonged stimulation of the vagus, or infusion of acetylcholine.

It has been repeatedly observed that worry or other emotional stress has a harmful effect on peptic ulcer; it may aggravate the symptoms or delay recovery. A history of some emotional upset occurring just before the onset of symptoms is often forthcoming. It is impossible to tell whether in such cases the injurious emotion has initiated the lesion or merely activated an existent lesion. Wolf and Wolff (1942) record some pertinent observations, made on a man aged fifty-six who had had a gastric fistula since the age of nine—

He was in excellent health and rarely had any digestive complaints. He was a sensitive, stubborn, conscientious fellow who was employed in their laboratory circumstances were such that during the period of the experiment he was at times sad, nervous, frightened because of troubles in his daily life. It was found that under basal conditions small amounts of acid were continuously secreted into his stomach, and there were spontaneous transitory phases of accelerated secretion, accompanied by blushing of the mucous membrane and vigorous contractions of the wall of the stomach. Fear or sadness, however, led promptly to pallor of the gastric mucosa and inhibition of acid secretion and of peristalsis. The more aggressive emotional states, such as resentment of an insult, mortification or continuous anxiety, had the opposite effect: hypersecretion and hypermotility ensued, the mucous membrane (which was of course visible because of the fistula) became red and turbid, so that it presented the picture described by gastroscopists as "hypertrophic gastritis." At these times the subject complained of heartburn and abdominal pain; it was noticeable that contractions which would not incommode him ordinarily caused pain when the stomach wall was thus engorged. Moreover, the susceptibility to hemorrhage was much greater, as would be expected, vigorous contractions would produce bleeding points on the mucosa, without any external trauma. The bleeding points of erosions would usually heal within twenty-four hours or less, under their protective coat of mucus. But if the mucus were aspirated away any irritant, such as mustard, would cause acute inflammation, œdema, and bleeding points, stimuli that were ordinarily painless, such as pinching of the mucosa, would in this engorged state cause pain. In another experiment a small erosion was subjected to the action of the man's own gastric juice for four days, without any protective mucus. Within twenty-four hours the lesion had become deeper, and at the end of four days it was 4 mm. in diameter and had the punched-out appearance of a chronic ulcer, with a granulating base. It was then covered with petroleum jelly to protect it against gastric juice, whereupon it healed completely within three days.

Wolf and Wolff emphasize that the gastric overactivity, consequent upon such

notions as hostility and worry, must act for a considerable period (as when a man broods over his troubles) if an ulcer is to result from it (presumably in a pre-supposed subject), and they instance, in support of this, the differing results obtained if histamine is administered in large repeated doses, or in a slowly absorbed medium so that its effect is sustained—it is the latter that does the damage. They conjecture that people who “blow off their steam” in words or actions are less likely to develop ulcer than those whose moods are not so explosive and short-lived. This is the kind of direct evidence at present available to relate emotional change to peptic ulcer. It leaves some important questions unanswered: the increasing preponderance of men among those with ulcer, for example. Explanations of this have been offered, which are unconvincing. But the importance of emotional disturbance in contributing to or aggravating ulcer may be conceded, without assuming that it has been proved to be wholly or mainly responsible. There are, of course, other factors to be reckoned with.

Since dyspepsia occurs in many who have not a peptic ulcer, the interest of the foregoing observations is wider than if it were solely a question of what causes ulcer. Many writers have pointed out how frequent are “functional” dyspepsias—disturbances of the functions in the absence of recognizable anatomical changes or demonstrable disease in the stomach and duodenum and elsewhere in the body” (Tidy). If this disturbance of function is of the same kind as the disturbances observed in angry or frightened people, and if anger and fear appear to be unduly frequent in those suffering from the “functional dyspepsias,” it is reasonable to assume that the common cause helps to produce the common effect. Neither of these requirements is fully satisfied, but in so heterogeneous a group as the negatively defined “functional dyspepsias” it would be odd if they were. What is more important is that there is a considerable proportion in whom the conditions are satisfied, and the inference seems warranted. The described changes in acidity and peristalsis have been observed in a number of non-ulcer dyspeptics in the Services, according to some, about half of these patients have hyperchlorhydria and disturbed peristalsis. Emotional disturbances are found with at least equal frequency among them—in particular, partly suppressed resentment and anxiety. The care and objectivity with which the examination of the patient’s mental state is carried out will determine how often such emotions are discovered. Uncooperative subjects and hasty interviews will bias the results in one direction, a convinced and persistent investigator may bias them in another. An average finding, probably, under war-time conditions, is that reported by Edwards and Copeman (1943) —

Of 217 “non-ulcer” dyspeptics, 101 were examined by a psychiatrist, who found an “abnormal psychological state” in 65 of them.

Unresolved tension is the most common state in such patients, with varying combinations of anxiety and depression. A German army doctor has reported that many men whose dyspepsia had cleared up while they were fighting in Poland had a recurrence when they were transferred to occupied France where they were comparatively inactive and (although he does not say this) isolated and hated. Unresolved tension would be an inevitable consequence of their situation.

NERVOUS DYSPEPSIA

Besides patients who show anomalies of secretion and motility attributable to morbid emotion, there are others whose complaint of indigestion may be an hysterical

or hypochondriacal symptom. A century and a half ago, Cullen found it necessary to draw a distinction between the two "neuroses," dyspepsia and hypochondriac. It is worth remembering that in those days Lettsom could say "at least half of the diseases, to which we are prone, originate from the influence of the passions on the human system," and Falconer was then writing his scholarly essay on "The Influence of the Passions upon Disorders of the Body." Not long after, Barras in Paris was defending the thesis that a disturbed and hypochondriac mind could only too easily consort with dyspepsia, which would disappear when the patient became serene or had a better object for his solicitude than his own stomach.

Gastro-intestinal symptoms are common and prominent among our patients occurring in varying frequency (up to about 40 per cent) according where the patients are seen (neurosis centre, medical out-patient department, general hospital) and how they have been referred and examined. It is not worthy that at a neurosis centre where, according to the psychiatrists' records, only 15 per cent of the patients complained, among other things, of dyspepsia, 35 per cent of these patients gave an affirmative answer to the intentionally vague inquiry (in a written questionnaire), "Do you suffer from stomach trouble?" and 21 per cent said they had at some time been on a special diet.

"Nervous dyspepsia" is not an illness—it is a symptom which may appear in a wide variety of psychiatric disorders, whether they be called neuroses or psychoses. As many schizophrenics and melancholics have had needlessly multiplied X-rays and test meals as patients with ulcer or gastric carcinoma have been misclassified as hypochondriacs, or sufferers from an anxiety state have had a laparotomy. The psychiatrist who has discounted a melancholic patient's complaint of dyspepsia until the ulcer perforated, and the surgeon who has mistakenly operated on a hysteric will have no desire for mutual criticism, but will agree on the variety of mental disturbances in which dyspepsia may appear as a symptom, and on the necessity for combining skill in detection of both mental and physical lesions.

Since nervous dyspepsia may appear in a wide range of psychiatric illnesses its prognosis and treatment will be those of the particular illness, and must therefore conform to the principles worked out for the different psychiatric syndromes. It is not a question of a special restricted diet, or, on the other hand, insistence on the repudiation of any dietetic restrictions at all: there is no particular drug regimen or psychotherapy that can be relied upon to do good for "non-organic" or "psychogenic" dyspepsia. The patient free from physical disease who complains that "her food lies heavy on her stomach," that "she feels sick and uncomfortable after her meals," that "she cannot eat because it upsets her so," cannot be diagnosed and treated unless the usual methods of psychiatric examination are employed, and there is no summary procedure which can obviate the need for this. It does not, of necessity, call for a psychiatrist to do it, but it calls for an acquaintance with adequate methods of investigating and treating the psychiatric side of an illness. The psychiatric is often mixed with the social aspect, and the practitioner will do well to take both into account.

References

- Edwards, H., and Copeman, W. S. C. (1943) *Brit med J*, 2, 640
 Wolf, S., and Wolff, H. G., (1942) *J Amer med Ass*, 120, 670

the individual's health is steadily being impaired his teeth are being undermined and lost. No better example could be found of a functionless part succumbing to disease.

The question of whether or not teeth are necessary to the proper assimilation of food, and therefore to good digestion, always excites controversy. In theory they should be, but the facts do not support the theory. All would agree that a set of clean healthy teeth in proper arrangement and used by their possessor as Nature intended them to be used, to grind up his food into a semi-fluid mass, ought to be an advantage to him in comparison with a toothless individual. But the advantage is one which paradoxically a great many individuals fail to utilize. Herbert and Bruske (1936), examining 500 English and 500 Dutch subjects, found a substantial proportion having front teeth only who masticated the test food better than another large proportion having a satisfactory complement of grinders. The fact is that the diet of modern civilized man does not require to be masticated.

In the prosthetic department of dental hospitals it is common to meet adults in a state of complete well-being who have been toothless for twenty or more years. When it is asked why they have come for artificial dentures it is always because of appearance and on the instigation of a son or daughter who desires to make the gift. There are still plenty of edentulous men and women in all classes of society who in the privacy of their homes take out their artificial teeth before they eat. More surprising still perhaps were the fractured jaw patients of the Croydon War Hospital. Many of these men had been transferred from France after months of treatment there with suppurating ununited fracture of the mandible. Here, under the care of J. F. Colyer (Sir Frank Colyer), their septic teeth were extracted and intermaxillary splints were used for fixing the fractured parts. Mostly, these patients could only take food by pushing it down the side of the cheek or through a space where teeth were missing. Yet these men, having been relieved of their sepsis, became healthy, strong enough to play football and put on weight.

ORAL SEPSIS

When digestive troubles are caused by the teeth, it is not absence of masticatory efficiency but preponderance of oral sepsis which is the cause. For example, Colyer (1911) cites cases of extensive dental caries in children treated by equally extensive extraction so that they became edentulous for the time being. The patients were weighed before and at intervals after treatment. All put on weight and the article concludes—"The cases quoted are sufficient evidence that the loss of masticating power does not interfere with the general health of the child, but increases the power of metabolism by removing a source of sepsis."

When it used to be the accepted order that a hospital patient, having had all his teeth removed, waited for six months before having his artificial plates fitted, it was repeatedly found that edentulous patients who had previously been toxic and suffered from indigestion had regained a healthy colour, had put on weight and had lost their indigestion.

William Hunter's paper "Oral Sepsis as a Cause of Septic Gastritis" (*The Practitioner*, 1900, 65, 611) is of classical importance. Speaking in 1913 at the Royal Society of Medicine in the special discussion on alimentary toxæmia, its

sources, consequences and treatment, in which fifty-six speakers took part, Hunter said that his studies which had been concerned with pernicious anæmia (1885) "commenced in the liver, had passed back to the portal blood, thence to the intes-

TABLE I

PERCENTAGES OF STREPTOCOCCI IN RELATION TO COLIFORMS IN 50 CASES OF TOTAL CLEARANCES

Case no	Before extraction	2 days after	2 weeks after	4 weeks after	2-4 years after
5437	16	9	7	5	
5438	7	5	4	4	8
5557	33	30	20	10	15
5690	28	24	18	16	18
5678	40	36	28	Not received	20
5679	36	33	25	20	22
5724	40	38	Not received	30	33
5689	40	35	30	22	
5739	6	5	4	4	All coh.
5608	35	33	27	20	
7076	28	26	20	12	11
7081	32	31	28	22	22
7088	33	31	25	18	
7089	37	35	26	20	All coh.
7094	25	24	20	16	8
7095	42	39	27	19	
8003	34	30	25	22	All coh
8006	20	18	12	10	
8010	30	25	22	15	10
9002	40	37	30	22	20
9003	41	34	29	Not received	
9007	30	28	24	20	All coh.
9008	25	24	20	15	
9013	34	33	27	20	10
9014	44	43	36	29	8
9092	39	34	27	20	All coh.
9207	17	13	9	9	10
9208	43	40	37	24	
9216	28	26	20	15	8
9218	45	40	30	25	All coh.
9219	32	28	28	26	10
9220	12	10	10	9	All coh.
9231	22	19	18	10	
9232	28	23	20	15	
9233	31	26	20	20	
9236	32	31	25	24	
9237	45	41	35	33	
9256	46	41	32	30	
9307	31	31	28	28	20
9308	45	44	42	36	
9320	32	31	29	25	
9455	29	25	25	22	
9583	26	26	20	20	All coh.
9594	29	28	27	25	
9585	41	Not received	35	30	
9586	21	20	20	15	
9737	31	Not received	17	15	
9738	24	24	20	Not received	
9739	31	30	28	" "	
9740	27	24	22	" "	

Column 2 is taken 2 days after the first extractions, irrespective of whether the operation completed the extractions necessary

tine and stomach and had finally ended at the mouth" To him we owe the term "oral sepsis" which he denounced as "the greatest cause of infective disease in the body, and the chief cause of most of the disturbances in the alimentary tract,

THE INTERPRETATION OF PHYSICAL SIGNS

IV—IN ABDOMINAL DISORDERS

By C E LAKIN, MD, FRCP, FRCS

Physician, Middlesex Hospital and London Fever Hospital

IT is fair to say that physical signs in the abdomen have never been systematized by medical writers to the same extent as those in the thorax. Yet, just as in the case of the chest, the greatest care has to be taken to make correct observations. A mere cursory examination, especially when the abdominal disorder is an acute one, may well lead to a disastrous ending. In bed-side teaching, errors of observation are naturally more severely censured than fallacies in interpretation, for if a start is made with a wrong premise, how can a correct conclusion be attained? The well-proven principle of endeavouring to determine first the site of a lesion and then its probable nature is as true of the abdomen as of other parts of the body. Yet this article is primarily concerned with the interpretation of signs rather than with the differential diagnosis of diseases.

PROCEDURE OF EXAMINATION

The chief difficulty in elucidating physical signs in the abdomen is due to the obstacle which the abdominal wall places in the way of palpation. Contraction of the abdominal muscles, whether active or reflex, must be overcome. Active contraction of the muscles is sometimes brought about by a patient in the supine position raising his head in order to see the palpating hand of the examiner. Difficulty is not infrequently caused by a nervous patient keeping the diaphragm fixed and pushing down the abdominal viscera as soon as he feels the hand of the observer. In such cases he should be instructed to breathe deeply in and out so that the examiner, at any rate during expiration, may be afforded an opportunity of better access. It need hardly be said that the examination should be carried out in a good light and that the whole abdomen should be exposed. It is usually held that more complete relaxation can be obtained by raising the shoulders on a pillow, but it is often advantageous to have the shoulders at the same level as the rest of the body, the pillow which supports the head extending no lower than the neck. Drawing up the legs may favour relaxation of the abdominal wall but if they are held in a tense position this manœuvre may have the opposite effect.

The two chief procedures at the practitioner's disposal in the examination of the abdomen are *inspection* and *palpation*, and it is difficult to say which is the more fruitful in results. Inspection furnishes information as to the state of nutrition, symmetry, contour, mobility, abnormal appearances of the skin, visible peristalsis and pulsation. Palpation will be concerned with muscular tone and rigidity, hyperæsthesia, tenderness, pitting of the skin, the presence of a fluid thrill, abnormal pulsation, the outline of organs, and the possible existence of deep resistance and tumours. Under the heading of palpation must be included rectal examination, without which no examination of the abdomen can be said to be complete.

ABDOMINAL DISTENSION

The healthy abdomen being perfectly symmetrical any departure from the normal contour will attract attention. Such alteration may, on the one hand, affect the whole of the abdomen, producing general distension or retraction or, on the other, affect a limited area only. Uniform enlargement may be due to gaseous distension, fluid in the peritoneal sac, a tumour, cystic or solid sufficiently large to fill the greater part of the abdominal cavity, or to sheer corpulence.

When distension is occasioned by fluid there may be some degree of bulging in the flanks, whereas antero-posterior bulging is more common in flatulent distension. The presence of fluid is confirmed by noticing that bulging is greater on the side towards which the patient is inclined, and if he sits or stands the lower part of the abdomen becomes more prominent. A fluid thrill, the presence of alternating dullness when the patient is turned from side to side, and possibly finding that the upper limit of dullness on percussion has a concave border when the patient is lying on his back, will all betoken the presence of fluid. Since alternating dullness or rather resonance depends upon the ability of the gas-containing intestine to reach and float upon the surface of the peritoneal collection of fluid, this sign will be absent in those cases in which the mesentery has undergone infiltration and shortening, such as sometimes occurs in tuberculous peritonitis.

Flatulent distension may accompany and render obscure the presence of a small quantity of fluid in the abdomen. In these cases it is found that if the knee-elbow position be assumed percussion in the neighbourhood of the umbilicus, which previously gave a tympanic note when the patient was supine, will now yield a dull one owing to the presence of fluid which has gravitated from the pelvis.

I recall two cases in which the sole complaint made by the patients was that of flatulence and increasing size of the waist. Examination revealed signs not only of gaseous distension but of a little free fluid in the peritoneum. In both instances a pelvic examination revealed the existence of a malignant neoplasm of an ovary, the distension being due to pressure upon the bowel, whilst involvement of the peritoneum by the infiltrating growth had led to the exudation of fluid.

Flatulent distension of the intestine occurring in intestinal obstruction, megacolon (Hirschsprung's disease), or atony of the bowel, may lead either to general or asymmetrical enlargement of the abdomen, but in the tympanites of typhoid fever and in generalized peritonitis general enlargement is found.

A very large thin-walled ovarian cyst may be difficult to distinguish from ascites, convexity of the upper limit of dullness on percussion and finding that the distance from the navel to the anterior iliac spine is greater on one side than the other, and that the circumference at the umbilicus is rather less than at a slightly lower level, favour the diagnosis of an ovarian cyst.

An enormously distended bladder may cause general enlargement of the abdomen.

In one such case under my observation the bladder contained over ten pints of urine; in another over eight pints were present.

Finally, it should be mentioned that the existence of lordosis of the spine may be responsible for apparent distension of the abdomen.

superficial epigastric veins in the lower part of the abdominal wall (pouring their blood into the femoral veins) and the superior epigastric veins (eventually returning their blood to the superior vena cava) become an important by-pass for blood should there be compression of either the superior or inferior vena cava. These enlarged veins are usually seen extending from the middle of the groin to the costal arches. If the inferior vena cava becomes obstructed, the direction of the blood current in these veins will be in an upward direction. If such veins are found on one side only, obstruction of the iliac vein on that side will be indicated. Bilateral enlargement of the veins in which the blood is flowing in a downward direction will suggest pressure on the superior vena cava.

Although not at all common, another configuration of enlarged veins, known traditionally as the caput Medusæ, is sometimes seen in the region of the umbilicus in cases of multilobular cirrhosis of the liver. In these veins the direction of flow will be away from the umbilicus. By means of the para-umbilical vein the blood of the portal system is brought into communication with the systemic system of veins on the abdominal wall. When a caput Medusæ exists it may be concluded that the obstruction is situated in the liver itself, for the upper end of the para-umbilical vein opens into the left main branch of the portal vein. Pressure upon the main trunk of the portal vein before entering the liver, such as might arise from a carcinoma of the head of the pancreas or enlarged lymph glands in the lesser omentum, will therefore not give rise to a caput Medusæ.

VISIBLE PERISTALSIS

Even normally in very thin persons the peristaltic movement of the stomach and intestine may occasionally be seen, but when an ordinary state of nutrition of the abdominal wall exists the occurrence of visible peristalsis is usually indicative of some obstruction to the onward flow of their contents. In obstruction at the pylorus an appearance not very unlike the rolling of a golf-ball may be observed passing across from under the left costal margin towards the pylorus. This is a noticeable feature in cases of congenital pyloric obstruction in infants and is especially likely to be detected after the baby is fed, but a similar, if coarser, movement is not infrequently seen in cicatricial stenosis and malignant pyloric obstruction in adults. Visible peristalsis of the intestine is more commonly seen in association with chronic and subacute intestinal obstruction than with acute cases. It may be accompanied by gurgling sounds and griping pain, muscular rigidity is not usually present.

When the lower part of the small intestine is obstructed it is sometimes possible to distinguish in the central portion of the abdomen a series of intestinal loops standing out one above the other—the so-called ladder-pattern type of distension—as coil after coil, starting below, gradually becomes distended. With the passage of time the distension becomes general and the ladder-pattern can no longer be distinguished. If the obstruction is low down in the large bowel, distension due to swelling of the colon is seen towards the periphery of the abdomen, and in some of these instances it may be possible to observe peristaltic waves passing from right to left in the distended transverse colon. The importance of examining the hernial orifices in abdominal disorders of sudden onset cannot be stressed too highly.

In cases of intestinal obstruction early and repeated *vomiting* with only a moderate degree of distension implies involvement of the small intestine, and the higher the level of the obstruction the more pronounced and urgent does the vomiting become. When obstruction affects the large bowel, vomiting is less intense but distension is more marked. There is a type of case which sometimes causes difficulty in which symptoms of a high intestinal obstruction are followed by a period of abatement only to be succeeded after a day or two by signs and symptoms of obstruction at a lower level. Such a clinical picture should always suggest the possibility of obstruction being due to the presence of a gall-stone in the small gut. In these cases the gall-stone ulcerates into the duodenum from the gall-bladder, producing symptoms of a high obstruction. As the gall-stone gradually passes along the small bowel the obstructive symptoms subside. Owing to the gradual decrease in the diameter of the small intestine, as the lower end is approached the stone once more blocks the lumen and symptoms of obstruction reappear.

DIAGNOSTIC PALPATION

Normally the abdominal wall possesses elasticity, but this may be lost and be replaced by a doughy resistance, and notably so in cases of tuberculous peritonitis.

In cases of acute inflammatory disorder, palpation in particular will afford information of the utmost consequence. By its means the existence of muscular rigidity, of tenderness and of any abnormal swelling, if such be present, are discovered. Of all the signs of peritonitis, rigidity of the abdominal *muscles* is the most important. Local rigidity will suggest in acute cases local peritonitis, whilst general rigidity will point to general involvement of the peritoneum, as occurs when a hollow viscus has perforated. There are certain facts, however, that have to be borne in mind —

(1) In inflammatory lesions limited to the pelvis there may be a complete absence of rigidity of the anterior abdominal wall.

(2) Muscular rigidity may be very slight or absent, even though peritonitis is present, especially when the abdominal wall is fat and flabby, with poorly developed muscle, and in late stages of the disorder, owing to toxæmia.

(3) Rigidity, as already mentioned, may be present in cases of thoracic disease and in lead poisoning, but in neither of these instances is pressure likely to produce pain.

However, in the average abdomen, peritonitis is shown by an increase in the muscular tone of the abdominal wall, and the pain experienced by the patient becomes greater as the palpating hand presses in towards the underlying inflamed area. For example, taking the most common instance of local peritonitis, namely, *acute appendicitis*, the lower abdomen will be seen to be moving with respiration less freely than the upper zones, and the right side less than the left. The lower portion of the right rectus abdominis will be rigid and deeper pressure will elicit tenderness. *Tenderness* is particularly likely to be felt at a spot just below the mid-point of a line drawn from the right anterior superior iliac spine to the umbilicus or at McBurney's point at the junction of the outer and middle thirds of the same line. In children, the maximum area of pain and tenderness is often around the umbilicus. Hyperæsthesia, too, as tested by drawing a pin over the skin, is frequently present in the right iliac fossa.

be carefully palpated with the palmar surface of the fingers to determine whether its surface is smooth, granulated or bossed. In some persons there is difficulty in deciding whether "hob-nails" are present or not, the whorled arrangement of fat in the superficial fascia may give the impression, when the hand presses the abdominal wall towards the resisting surface of the liver, that these rounded irregularities are situated on the surface of the liver itself. In such cases it is wise to palpate in a similar manner the abdominal wall in other positions, if no such whorls are felt the presumption is that the case is one with irregularities on the surface of the liver. Even so, it may be difficult from palpation alone to decide whether a "hob-nail" liver is present or whether the liver is studded with innumerable tiny metastases. When bosses are felt it may be possible to recognize the presence of umbilication, if such be present this is strongly in favour of secondary carcinomatous deposits, although a gumma may sometimes show a depression on its surface. The consistence of the liver should be taken into account; a resistant smooth-surfaced liver with a distinct edge is found in lardaceous disease, but before making such a diagnosis other organs should be examined and etiological considerations taken into account. A smooth liver but much less firm, the lower edge of which it is difficult to feel, is suggestive of fatty infiltration, a condition not unlikely to be met with in the late stages of pulmonary tuberculosis. In the case of a fatty liver a much better idea of its size can often be obtained by percussion, on account of the difficulty of accurately determining the position of its edge by palpation. Even a gross enlargement of the liver may be missed by a medical student through neglecting to start palpating at a sufficiently low level.

The presence of tenderness should be noted. In a cirrhotic liver tenderness, if present, is usually ascribed to the existence of perihepatitis. General tenderness is often found in passive venous congestion (nutmeg liver) and slight tenderness often accompanies the presence of metastatic deposits. Localized tenderness is likely to be elicited when an abscess of the liver is approaching the surface.

An enlarged *spleen* possesses several characteristic features one alone will be emphasized here. When there is considerable enlargement and the question of distinguishing it from a renal swelling arises, the tumour is likely to be a spleen if a lack of resistance is found when pressure is exerted over the muscles intervening between the posterior border of the swelling and the spinal column, for most enlargements or tumours of the kidney pass well back into the loin and offer resistance to the fingers.

In a recent examination at Cambridge a patient with a prolapsed enlarged spleen was among the cases shown, but few of the candidates appreciated the value of such an observation in deciding the point.

An enlarged *gall-bladder* sometimes causes perplexity. It forms a smooth pear-shaped swelling projecting from the lower edge of the liver just outside the lateral border of the right rectus abdominis. As it enlarges, it tends to pass towards the middle line, so that when a patient is lying on his back it is unlikely to be found external to the mid-clavicular line. If it be examined bimanually, unless it has contracted adhesions, it can be made to display a sort of pendulum-like movement, the fundus passing through a bigger arc than the neck when pressure is exerted.

in a lateral direction, first by one hand and then the other. When enlarged secondary to malignant disease of the head of the pancreas it is usually painless, if full of stones it may be firm and tender, and it is usually elastic, tense and tender when forming a mucocele secondary to an impacted stone in the cystic duct.

The *pancreas* is not likely to be felt unless occupied by a tumour or when swollen and infiltrated by blood, as in instances of acute pancreatitis.

The *omentum*, when infiltrated with fibro-caseous material in cases of tuberculous peritonitis, is sometimes felt like a thick strand of rope passing across the upper part of the abdomen. A band of resonance can usually be found intervening between it and the costal margin. Less commonly it forms a similar transverse mass in cancer of the peritoneum.

When an *abdominal tumour* is discovered, the first point to be determined is whether it is a tumour of the abdominal wall or whether it is arising within the abdominal cavity. If the abdominal wall can be moved from side to side over the tumour the swelling is likely to have arisen in the abdomen. When a tumour lies in the abdominal parietes it cannot be moved apart from the wall, and when grasped by the hand the fingers can often be made almost to meet behind it. If it is superficial to the rectus abdominis it will become more prominent when this muscle is made to contract. If lying in the wall external to the rectus abdominis it will become more prominent if the patient is directed to shut his mouth, hold his nose and then blow. "Phantom tumours" are usually due to the contraction of a segment of the rectus abdominis muscle.

In the case of an *intra-abdominal tumour* of new formation an attempt must be made to determine its nature and ascertain its source of origin. This will entail observation as to its exact position, its outline, the character of its surface, its consistence, whether it is movable or fixed and whether it is pulsatile or fluctuant. A globular outline is characteristic of a fluid tumour (cyst), whereas a nodular surface is suggestive of a solid tumour. Although a nodular surface increases the likelihood of the neoplasm being malignant it is only necessary to instance uterine fibroids in conceding that simple tumours may present this feature. The consistence of a swelling may be informative, faecal masses, for instance, can often be moulded by pressure of the fingers through the abdominal wall. Tumours of the liver, spleen and kidney will move with respiration unless fixed by infiltration, and so will neoplasms of naturally movable parts, like the transverse colon, although in their later stages they may become fixed by the formation of adhesions or by their very size. Examples of tumours that do not move with respiration are new growths of the pancreas and aneurysms of the abdominal aorta. A mesenteric cyst can usually be made to move much more freely in a direction at right angles to the plane of the mesenteric attachment, that is to say it will be more freely motile in the direction of a line drawn from the right hypochondrium to the left iliac fossa.

Forcible pulsation of the abdominal aorta is sometimes mistaken for an aneurysm. No case should be diagnosed as an *abdominal aneurysm* unless a tumour that can be grasped between the fingers is felt, and the tumour thus palpated yields expansile pulsation. A systolic murmur can usually be heard over it and sometimes a thrill is present. An abdominal aneurysm is very rare in women, but forcible

acute rheumatism with danger of heart disease, chronic cases with acute "flare-ups," and acute articular rheumatism with clinical abnormalities. Cases of resistant sciatica and persistent rheumatism of infective type are also stated to respond well, and marked success was obtained in a case of severe chorea.

EARLY REHABILITATION IN ABDOMINAL SURGERY

UNDER this heading A. Shorter (*Lancet*, February 19, 1944, I, 243) gives a practical scheme of exercises to be carried out in bed after abdominal operations, and by means of which post-operative chest complications and venous stagnation can be prevented and muscular tone and joint efficiency preserved. Before operation the patient is instructed in breathing and coughing and a brief explanation of the exercises to be carried out post-operatively is given. Smoking is prohibited, so that a clear airway may be maintained. On the first and second post-operative days the patient, under expert supervision, practises thoracic breathing, coughing and retraction of the abdominal wall. To begin with breathing may be shallow and difficult, the chest must be laterally expanded in inspiration and gentle forced expiration is induced by manual pressure on the lower ribs. Patients may need reassurance before being persuaded to cough, particularly after operation for hernia, manual pressure is applied over the whole area of the operation wound, and the cough usually results in the release of much phlegm. Treatment is continued until breathing is free and the breath sounds clear. On the third and fourth days abdominal contractions, with the abdominal wall shortened in expiration and not held rigidly, and leg exercises, consisting of movements of the hip, knee, ankle and toe joints, are added. These exercises are increased on the fourth and fifth days and movements of the head and arms included. Provided there is no contraindication in chest or abdomen, by the sixth and seventh days the exercises can be done freely with full range of movement, and trunk exercises, in the form of extension, flexion, side-flexion and rotation are instituted, and the abdominal retractions are carried out with expiration. From the eighth to the fourteenth day the exercises are done three times daily, duration depending on the age and strength, stopping short of fatigue. Exercises for extension of the back and legs are added. After the fourteenth day the exercises become more strenuous, particularly those for the back, abdomen, glutei and quadriceps. Patients who have undergone appendectomy by muscle-splitting incision are usually allowed up on the tenth post-operative day; thus the scheme of exercises is some-

what speeded up. Hernia patients get up on the seventeenth post-operative day. In addition the physical benefits of the scheme, the patient morale is maintained during the post-operative period. Rehabilitation in the form of graded exercises, games and light occupational work proceeds after the patient is up, and usually is ready for discharge in one week, and two weeks later is able to resume work.

HIRSCHPRUNG'S DISEASE TREATED BY SPINAL ANÆSTHESIA

RECORDS of twelve cases of Hirschsprung's disease treated at the Hospital for Sick Children, Great Ormond Street, six of which are reported as cured for three years to nine months, three as improving, one as uninfluenced, and three remaining two under observation for too short a time to judge the results, indicate a more favourable prognosis for this disease than generally assumed (Margaret Hawksley, *British Journal of Surgery*, January 1941, 31, 245). The anæsthetic employed was light percaïne 1-15 the dosage being calculated either as 1 c.c. per year of age of patient or by the Howells-Jones formula. No basal narcotic premedication is used but just before the anæsthesia $\frac{1}{2}$ gram ephedrine is given intramuscularly. The percaïne, warmed to blood heat, is injected into the space between the second and third lumbar vertebrae while the child is sitting up, fifteen to twenty seconds should be taken for the injection. Refractory children can be given a little ephedrine while the injection is being given and then sat up. Children under three years of age are kept in the sitting position for fifteen seconds, over this age for twenty seconds. The child is then placed on its back in the reversed Trendelenburg position, and the position maintained for five minutes. The table is then tilted to bring the shoulders downwards. About twenty minutes elapse before the characteristic picture is obtained, the child appears pale, lies quietly and becomes drowsy. This lasts for about half an hour. Visible peristalsis occurs and then faecal matter should be removed manually. At the same time the degree of spasm at the pelvic rectal junction is assessed and, if contracted, manually dilated. Quantities of flatus are usually passed. After-treatment consists of washouts every other day, if spontaneous bowel action does not occur, and liquid paraffin each night. In some cases a weekly enema is necessary. Careful diagnosis of the condition is important. The main features are abdominal distension, constipation (sometimes spurious diarrhoea) and marked visible peristalsis. A warning is given against making a diagnosis on the evidence of one X-ray film of a barium enema.

REVIEWS OF BOOKS

Narco-Analysis By STEPHEN HORSLEY
Oxford Medical Publications London
Humphrey Milford Pp 134. Price
8s 6d

A NEW technique in short-cut psychotherapy" how Dr Horsley describes the procedure to a development of which he has himself substantially contributed. It is hardly possible to refine this method more accurately than as a combination of narcosis with psychotherapy. The narcosis is usually produced by intravenous amobarbital; the psychotherapy is not as a rule intensive. Dr Horsley ranges over many of the fields of application of narcotic drugs in psychiatry, and examines the points of similarity and difference between hypnosis and the method he describes. The book will be of use to those beginners in psychiatry who wish to make use of a time-saving substitute for some regular methods that demand patience as well as skill. At the present time, when hysterical disturbances of memory are usually common and this quick method of investigating and treating such conditions is in favour, a full account of all the recent articles and letters on the subject is not without value, but it would have been possible to present all the significant matter in much briefer compass.

R.A.M.C. By ANTHONY COTTERELL
London Hutchinson & Co (Publishers)
Ltd, 1944. Pp 116 Illustrations 24-
Price 6s

OPENING in a most attractive manner with the personal narratives of six wounded soldiers—in an opening which succeeds in gripping the attention of the reader at the outset—the author proceeds to give a detailed description of the many activities and duties of the R.A.M.C. in modern warfare. Every branch of the service is covered, and the reader realizes, perhaps for the first time, the dangers and difficulties which have to be faced and the consummate bravery of all concerned, including the wounded themselves. In addition to being technically instructive the book is intensely human, and will thus be read with pleasure and gratitude by the general public as well as by those for whom it has a specific interest.

NEW EDITIONS

THE issue of the 1944 edition of *The Medical Directory* (J & A. Churchill, 63s) marks the centenary of its publication. The passing of

the Apothecaries Act in 1815 established the first boundary between the qualified medical man and the quack, and the publication of the first issue of the Directory, by Mr John Churchill, the founder of the firm of J & A Churchill Ltd, and grandfather of the present Managing Director, with the object of correlating in one volume the names, qualifications and appointments of members of the medical profession, marked another step in the upward trend of medicine. A glance at the numerical summary of the medical profession in this, the 100th edition, shows the continuous growth in the numbers of those qualifying; in the year 1850, when the figures referred only to those practising in this country, the total of qualified medical practitioners was 10,962. In the year 1860 the names of practitioners in Scotland, Ireland and abroad were added, and ten years later those in the Services. A steady increase in the total figure has continued throughout the hundred years and for 1944 has reached 68,235, an increase of 1,495 on the figure for 1943. Both the medical profession and the general public owe a debt of gratitude to the House of Churchill for the publication of the Directory, and warmest congratulations are offered on the occasion of the appearance of the one hundredth edition.

THE six years that have elapsed since the appearance of the twenty-first edition of *The Extra Pharmacopœia*, Vol 2, by W H MARTINDALE (edited by C E CORFIELD, B.Sc., F.I.C., Ph.C., under the auspices of the Revision Committee of the Pharmaceutical Society of Great Britain) have witnessed many advances in medicine and chemistry, despite or in some instances because of the world war. The publication of the twenty-second edition (*The Pharmaceutical Press*, 27s 6d) will therefore be warmly welcomed. The new additions are many, but special interest may attach to the section on the use of penicillin in the treatment of wounds, the new sulphonamide derivatives, the inclusion of much new information in the chapter on the vitamins, and the further uses of the synthetic hormone stilbœstrol. The chapter on proprietary medicines now runs to fifty-eight pages and in addition to new preparations there is a useful section dealing with the provisions under the Pharmacy and Medicines Act, 1941. Congratulations are due to the editors and publishers for a war-time production which bears not the slightest trace of consequent economies and difficulties.

NOTES AND PREPARATIONS

NEW PREPARATIONS

HEPAMINO is a proteolysed liver preparation for use in the treatment of megalocytic anæmias. Clinical trials are stated to have shown it to be effective also in certain cases of pernicious anæmia in which there is sensitivity to or difficulty in procuring injections, and in anæmias refractory to the usual hæmatinic agents. The manufacturers are Evans Sons Lescher & Webb Ltd, Speke, Liverpool 19, and London, by whom Hepamino is issued in 5-ounce jars, price 15s (subject to professional discount). Literature can be obtained on application.

'WELLCOME' BRAND STERILIZED SULPHANILAMIDE is now issued in special protective sterile envelopes containing 5 gm powder in packings of 6, 25 and 100. This issue is in addition to the sealed 15 gm bottle pack. Another product, 'WELLCOME' BRAND STERILIZED SULPHANILAMIDE COMPOUND, is a finely divided, highly mobile powder containing in addition to the sulphanilamide 5 per cent zinc oxide. This latter preparation is suitable for surface wounds and should not be used for implantation into enclosed cavities. The manufacturers are Burroughs Wellcome & Co., 183-193 Euston Road, London, N W 1, from whom further particulars can be obtained.

INSULIN PRICE REDUCTION

As a result of further research which has led to an increase in the yield of insulin from pancreas, the British Insulin Manufacturers (Allen & Hanbury Ltd, Boots Pure Drug Co Ltd., the British Drug Houses Ltd, and Burroughs Wellcome & Co.) announce a reduction in price of all brands of unmodified and modified insulin as from February 14, 1944.

SURGICAL RUBBER GLOVES

ANY practitioner or consultant requiring surgical rubber gloves for professional use should apply to the Secretary of the Central Medical War Committee, British Medical Association House, Tavistock Square, W C 1, marking the envelope "Gloves" in the top left-hand corner, and enclosing stamped addressed envelope for reply. He will then receive a booklet of six certificates for the year 1944.

THE EXTRA PHARMACOPŒIA

A SUPPLEMENT to volume 1 of the *Extra Pharmacopœia* (Martindale), twenty-second edition, 1941, has been issued in view of the many changes that have taken place during the

period since its publication. The supplement also contains the revised National War Formulary, a resumé of the Statutory Orders concerning supply of drugs, and a list of new proprietary names not included in the 1941 edition. Copies can be obtained from the Pharmaceutical Press, 17 Bloomsbury Square, London, W C 1, price 2s.

PRESCRIPTION PADS

THE manufacturers of the PINOLEUM BRAND INHALANT announce that they have a limited number of prescription pads and refills, which may be obtained upon application. They point out that pinoleum brand inhalant can still be obtained with or without ephedrine to meet prescriptions from medical practitioners. Applications for the prescription pads should be made to the Chesebrough Manufacturing Company, Ltd, Victoria Road, Willesden, London N W 10.

OPERATIVE PROCEDURE

THIS is the title of a book published by Messrs. Johnson & Johnson in America. The 81 plates of line drawings representing different surgical procedures, many of which have appeared in *Surgery, Gynecology and Obstetrics* and other surgical journals, have been carefully prepared in collaboration with the staff of the first named journal. These line drawings are beautifully done and should make a strong appeal to all interested in surgery. The book will shortly be published over here by Messrs. Johnson & Johnson, Slough, Bucks, and will be obtainable at the price of 5s. Any profits from the sale of the book will be devoted to a medical charity.

CONTENTS FOR MAY, 1944

DISORDERS OF THE SKIN

- Sulphonamides in Dermatology* By H W Barber, MB, F.R.C.P.
Scabies By Henry MacCormac, C.B.E., M.D., F.R.C.P.
The Causes and Treatment of Acute Dermatitis. By J Ferguson Smith, M.D.
Acne Vulgaris By John T Ingram, M.D., F.R.C.P.
Skin Disorders in the New-born Infant By J L Henderson, M.D., F.R.C.P.D.

The Interpretation of Physical Signs Vol. 1
Otolaryngology By F C Ormerod, M.D., F.R.C.S.

SULPHONAMIDES IN DERMATOLOGY

By H W BARBER, M B, B Ch, F R C P

Physician in Charge of the Skin Department, Guy's Hospital

IN an article on diseases of the skin caused by streptococcal infection, written in 1931, I said that "the discovery of an anti-streptococcal therapeutic agent, as potent in its action as are the organic arsenical compounds in syphilis, would abolish many acute and chronic diseases, the suffering and mortality from which are great." The advent of the sulphonamide compounds raised hopes that this prophecy might be fulfilled, and admittedly their discovery is one of the greatest advances in therapeutics of all time. Nevertheless, they fall short of the ideal envisaged for several reasons. Thus, whilst invaluable in acute infection by the hæmolytic streptococcus, the pneumococcus, the meningococcus and the gonococcus, they are far less potent against the less virulent strains of streptococcus and in chronic infections, and the risk of severe and dangerous toxic effects precludes their use over long periods. In penicillin, perhaps, has been found an equally or more effective substance without these disadvantages.

As with all new methods of treatment, the use of the sulphonamide compounds has been grossly abused. They have been, and still are, prescribed without rhyme or reason for conditions in which they could do no possible good, and might well prove actually harmful or dangerous. Not long ago I was assured by a patient, who had been an inmate of a cottage hospital, that to his certain knowledge all the patients, including himself, were being given sulphapyridine. This state of affairs is not only ridiculous, but reprehensible in the extreme. It reduces therapeutics to the level of the cure-all patent medicines, and the medical profession to that of their vendors.

LOCAL APPLICATIONS AND SENSITIZATION

Dermatologists, at any rate in this country, have on the whole been rightly conservative both in their use of these drugs and in claims as to their value in diseases of the skin. At the present time, however, there is a remarkable difference of opinion concerning their efficacy as local applications in pyodermias, such as impetigo, and the risk of sensitization that such treatment entails. It is extremely difficult to adjudicate fairly upon this controversy, since competent observers of experience hold diametrically opposite views.

The argument involves two main considerations, namely, first, whether or not the topical use of the sulphonamides is so superior to older methods of local treatment that it is justifiable to take the slight risk that sensitization of the skin to them may occur; and, secondly, whether or not the results of sensitization.

may be so serious as to preclude entirely the local application of these drugs in superficial pyogenic infections

With regard to the first consideration some observers have compared the effects obtained in *impetigo and allied conditions* by this new method, e.g., sulphathiazole as a powder or in ointment and paste, with those produced by older remedies (Sams and Capland, 1941, Steigman, 1942, Cohen, 1942), and have claimed that the former were markedly superior and that no ill-effects occurred, but, as Tate and Klorfajn (1944) pertinently remark, the older remedy selected in some instances hardly provides a fair comparison. Steigman, for example, chose dilute ammoniated mercury ointment, which no expert would prescribe for the active stage of impetigo.

I have been at pains to obtain the opinions both of dermatological colleagues and of general practitioners. Some of the former have completely abandoned the use of sulphonamides locally for impetigo, not so much owing to the risk of sensitization, but because they found them inferior to agents previously used and the majority of the latter had come to the same conclusion.

Recently a medical man consulted me for an acute attack of facial impetigo. He was unwilling to take sulphathiazole internally, but agreed to try a 5 per cent proprietary preparation locally. On his own initiative he applied this on one side of his face and mercurial cream on the other. The latter proved far more effective.

My own opinion on this point is of little value because, being content with my habitual methods of local treatment of impetigo and other pyodermias, I have little experience of topical therapy with sulphonamides in these diseases. When I have prescribed it, I have seldom been impressed. Thus, in spite of the enthusiasm of many observers, I am not convinced that sulphanilamide or sulphathiazole afford quicker results than those obtained with older and eminently safe methods. My limited experience, in fact, is to the contrary.

The second consideration—the risk of sensitization—will be dealt with in an analysis of the recent paper by Tate and Klorfajn (1944). I have an impression—it is no more—that sensitization of the skin to external applications is more likely to occur with sulphanilamide than with sulphathiazole, and the statement of those who claim to have treated hundreds of cases of impetigo and other pyodermias with 5 per cent sulphathiazole paste without ill-effects cannot be ignored. On the other hand, sensitization of the skin to this drug does occur and according to the *Army Medical Dept Bulletin*, Nov. 1943 (no 29, par 22b) “sensitization may follow the use of any of the sulphonamides, but the risk is greatest with sulphathiazole.”

Lt-Col D M Pillsbury, who with his co-workers was one of the first to carry out carefully controlled observations on the local treatment of pyogenic cutaneous infections with sulphathiazole in an emulsion base (1941), has kindly informed me that he has seen several cases of sensitization to this drug, but that he has much less experience of the topical use of sulphanilamide. On the other hand sensitization to *sulphadiazine* he has met with rarely, neither when it has been applied locally as a cream, nor when given internally. Sulphadiazine cream has, in fact, been adopted almost as a routine application for impetigo in the American Army, and I accept without reserve Col Pillsbury's opinion of its efficacy.

It is generally agreed that in the treatment of pyodermias with sulphonamides applied locally it is inadvisable to continue with them for more than five days, but even this precaution does not necessarily preclude the risk of sensitization. Although this risk has been recognized by dermatologists and others for some time past, an important contribution to the subject by Tate and Klorfajn (1944), based on their observations in the Middle East, has only recently been published. In considering their conclusions it should be noted that in nearly all their cases of sensitization, sulphanilamide had been the drug prescribed in ointment, pastes, or as a powder. In a few cases sulphapyridine was suspected. Consequently their conclusions do not necessarily apply to sulphathiazole, or to sulphadiazine. Their paper should be studied in detail, but the main points may be summarized as follows —

Incidence — During a period of six months out of 2,280 admissions to the skin department of a military hospital fifty-five were suffering from sulphonamide dermatitis produced by local applications of the drugs (2.4 per cent).

Clinical features — These were "those commonly observed in cases of contact dermatitis due to epidermal sensitization," the eruption being an acute vesicular eczema. Except in two cases, not only was there the primary dermatitis at the site of application, but also a widespread secondary eruption on parts to which the drug had not been applied. In four instances this occurred only on areas exposed to light. In severe cases, constitutional disturbances with pyrexia were present.

Period of application — Out of thirty cases in which this was known with some accuracy, in eleven the dermatitis appeared within four to seven days, and in ten after seven to fourteen days. The important point was thus established that sensitization may occur after less than a week's treatment.

Nature of original disease — This point also is of importance. Out of the fifty-five cases fifteen had impetigo, and twelve ecthyma. Only two were cases of gunshot wounds. The significance of this will be discussed later.

Preparations causing dermatitis — Sulphanilamide in pastes, ointments, and powder was usually responsible, but in three cases sulphapyridine was suspected. No case is recorded in which sulphathiazole could be incriminated, but it may not have been generally available at the time these observations were made.

"Patch tests" — These revealed facts of practical and theoretical interest. In sensitized persons positive reactions were obtained both with sulphanilamide and sulphapyridine, no matter which drug had been the original sensitizing agent, but on the intact skin strong concentrations were required to evoke a reaction, which even then was generally weak, sulphanilamide producing much stronger responses than sulphapyridine. After light scarification of the horny layer strong positive reactions, practically equal with both drugs, were obtained. Sulphathiazole evoked no response on intact skin, and had not been tested after scarification.

Although the authors claim that the features of sulphonamide dermatitis were those of contact dermatitis due to epidermal sensitization, it should be noted that genuine patch tests, i.e., the application of the suspected irritants to intact and normal areas of skin, were positive only when sulphanilamide or sulphapyridine were applied in strong concentrations, and even then were weak, they were completely negative with sulphathiazole. As is well known, in cases of dermatitis venenata the application of the responsible agent, even in high dilution, to the intact skin usually provokes a strongly positive reaction. That scarification, i.e., exposure of the Malpighian cells, was necessary to obtain such a reaction with the sulphonamides appears to render doubtful the claim that the dermatitis they may provoke is strictly comparable to the common contact dermatitis. This is a point that requires further investigation. The scarification test is not a genuine patch test.

Internal administration of sulphonamides to sensitized subjects — In those who had had sulphonamide dermatitis and had recovered, the administration of a small dose of sulphanilamide, sulphapyridine, sulphathiazole, or sulphaguanidine provoked a relapse of the dermatitis (1) on the areas of skin previously involved by the primary and, if present, secondary eruptions, (2) at the sites of "patch tests." In two cases with no secondary

eruption, i.e., without *general* sensitization of the skin, the recrudescence was confined strictly to the sites of the previous dermatitis

Duration of sensitization —The authors conclude that sensitization is probably permanent, three patients, for example, being still sensitive after eighteen, fifteen and six months respectively

Effect of sunlight —Exposure to sunlight favours the development of sensitization, and it would seem certain that more cases of sensitization are met with in tropical or sub-tropical climates than in temperate zones (*Army Medical Department Bulletin*, no 29, November 1943) As has long been known, the sulphonamides are photosensitizing agents, but their effect is not permanent

Desensitization —An attempt to desensitize the patients by giving minute amounts of the drug orally proved unsuccessful, but it was discovered by chance that if, despite the severity of the reaction, the drug were continued in moderate dosage (1 gm thrice daily), desensitization was achieved in several cases, and the "patch tests" became negative

These observations confirm those of Erskine (1939, 1941, 1942) upon sulphonamide sensitization provoked by oral administration of the drugs. He emphasized the important point that toxic reactions, including various types of eruption, may be due either to allergic hypersensitiveness or to drug retention. These two types of reaction may be differentiated by Werner's test of sulphonamide excretion. In patients with allergic sensitization excretion is normal, but with drug retention it is diminished, and there may be albuminuria and evidence of hepatic damage, such as urobilinuria. In the former case Erskine showed that desensitization could be effected by continuing the drug in the same or smaller dosage, and this is desirable owing to the risk of immediate violent reactions should it be given later to a sensitized subject. With drug retention, however, it is imperative the sulphonamide treatment be discontinued, lest serious and even fatal damage to vital organs result. Erskine rightly insists that the risk of these toxic reactions is minimized if sulphonamides are given for seven days only, or less. Tate and Klorfajn (1944) conclude that —

"topical sulphonamide therapy for skin diseases and minor injuries is unjustifiable and should be discontinued. It should be reserved strictly for cases where withholding it might endanger life or lead to deformity"

Against this it may be argued that in the majority of their cases the treatment had been continued for more than five days, and that apparently in none had sulphathiazole or sulphadiazine been employed

One significant point to which these authors draw attention is that in only two cases of gunshot wounds and in none of *severe* burns was sulphonamide dermatitis met with. The explanation of this observation, of course, is that in eczematous dermatitis it is the Malpighian cells of the epidermis that are sensitized, and it is repeated contact of the sulphonamide with these, when the stratum corneum is destroyed or damaged, that provokes the eczematous response. Therefore it is in the treatment of superficial skin affections that this response may occur, and not in that of deep wounds or burns in which the whole epidermis has been destroyed. Epidermal sensitization to these drugs is particularly likely to result when they are applied to an eczematized surface, since the Malpighian cells are already sensitized. Finally, the authors remark that among thousands of cases, in which sulphonamides had been given *orally* not one case of eczematous dermatitis had been seen

PRINCIPLES OF INTERNAL TREATMENT WITH THE SULPHONAMIDES

The diseases of the skin for which one or other of the sulphonamides may justifiably be given, or have been rationally tried, orally, are conveniently divisible into three groups —(1) Those caused by acute infections with various organisms, (2) chronic diseases due, or suspected to be due, to infective organisms, (3) certain eruptions that are or may sometimes be caused by bacteraemia, or the circulation of bacterial toxins

The following table includes the majority of these diseases, and provides what it is hoped are fair comments on the results of sulphonamide treatment —

ACUTE INFECTIONS

<i>Micro-organism</i>		<i>Disease</i>		<i>Results of treatment</i>
STREPTOCOCCUS	-	Impetigo contagiosa	-	Favourable
		Erysipelas	-	"
		? Pyoderma gangrenosum	-	"
STAPHYLOCOCCUS	-	Furuncle and carbuncle	-	Uncertain (sulphathiazole drug of choice)
		Granuloma pyogenicum	-	Good result reported but hardly indicated
		Circinate and bullous impetigo	-	Good results reported with sulphathiazole
DIPLOCOCCUS (Bulloch, Demme)		Pemphigus acutus	-	Good results reported
BACILLUS OF SWINE ERYSIPELAS		Erysipeloid	-	Favourable
BACILLUS OF DUCREY-UNNA		Chancroid	-	Favourable
? VACCINIA VIRUS	-	"Milkmaid's nodules"	-	Good result reported

CHRONIC INFECTIONS

<i>Micro-organism</i>		<i>Disease</i>		<i>Results of treatment</i>
STREPTOCOCCUS	-	Relapsing lymphangitis with or without elephantiasis		Good results obtained but uncertain
		Chronic streptococcal dermatitis with intertrigo		" " "
		Ecthyma	-	Seldom indicated
STAPHYLOCOCCUS	-	Sycosis barbae	-	Good results reported but doubtful permanent effect
		Pustular acne	-	" " "
		Hydradenitis suppurativa	-	" " "
		Infective eczematoid dermatitis	-	Good results reported but risk of sensitization considerable
VIRUSES	-	Lymphogranuloma venereum		Favourable if given in early stages
		? Dermatitis herpetiformis	-	Sulphapyridine of striking value but effect apparently temporary
		? Pemphigus vulgaris	-	Temporary improvement often occurs and even apparent cures reported but effect seldom lasting
		? Pemphigus vegetans	-	Cures with sulphapyridine reported other sulphonamides without effect

ERUPTIONS SOMETIMES OR ALWAYS CAUSED BY BACTERIÆMIA OR THE CIRCULATION OF BACTERIAL TOXINS

<i>Eruption</i>	<i>Results of treatment</i>
ERYTHEMA MULTIFORME - - -	When caused by acute or chronic streptococcal infection may respond quickly but treatment of closed foci of infection essential
ERYTHEMA SCARLATINIFORME - - -	
ERYTHEMA ANNULARE CENTRIFUGUM - - -	
ERYTHEMA INDURATUM (streptococcal form) - - -	
LUPUS ERYTHEMATOSUS - - -	The streptococcal form may respond well but reactions often severe, particularly in acute cases. Removal of closed foci of infection should be effected first. Tuberculous form non-responsive.
PUSTULAR PSORIASIS AND PUSTULAR BACTRIDE OF THE EXTREMITIES	Apparently always due to bacteraemia or toxæmia from an acute or chronic streptococcal infection. Sulphonamides of value in acute cases and in chronic ones if the eruption does not respond completely after removal of closed foci of infection.

DOSAGE

The dosage and duration of treatment must obviously, depend upon whether the disease is acute or chronic. In acute diseases the principles are simple and generally agreed upon, namely to give full doses on the first day of treatment in order to obtain an adequate concentration of the drug in the blood rapidly, to space the doses so that the concentration is maintained, to reduce the dosage slightly on subsequent days, and to omit the drug after three or four days if the desired effect has been obtained, and in any case to do so after a maximum of seven days' treatment. In an acute and severe case of impetigo contagiosa, for example, in which disease I employ sulphathiazole, the following scheme of dosage is recommended—2 gm. are given with a tumbler of water at 8 a.m., 4 p.m., and at bedtime on the first day, and 1½ gm. at the same times on each of the two or three succeeding days—a total of 15 to 19½ gm. In the majority of cases this treatment, combined with simple antiseptic local applications, will bring the eruption under complete control.

No definite scheme of dosage can be laid down in cases of chronic infection. Formerly I gave relatively small doses and continued the drug for a fortnight, or until symptoms of intolerance occurred, such as drug fever, gastro-intestinal disturbances, or some diminution in the white-cell count. I now prefer to give a short intensive course of treatment for a week or less as for acute infection, and if necessary repeat this after a while, or give small doses for a longer period. By this method the risk of drug sensitization and of serious toxic effects is diminished.

I cannot here discuss the possible manifestations of allergy to, or toxæmia from, the sulphonamides. They are admirably summarized in a table reproduced in the "Manual of Dermatology" by Pillsbury, Sulzberger, and Livingood (1943) and the more important are now well recognized. From this table it would appear that sulphadiazine is the least noxious, but this may be partly due to its restricted use. Sulphathiazole is less toxic to the bone marrow and liver than sulphanilamide or sulphapyridine, but like the latter is liable to cause hæmaturia unless copious fluids are taken during treatment.

Needless to say, when repeated courses of sulphonamide therapy are prescribed, when the drugs are given in small dosage over a considerable period, it is imperative that repeated blood examinations be made, that the urine be frequently tested for evidence of hepatic or renal damage, and that the possibility of fluid retention be borne in mind.

A most important precaution before prescribing any of the sulphonamides is to find out if the patient has previously been treated with one of them, since violent and even dangerous reactions may result even from minute doses in anyone who has been sensitized.

THERAPEUTIC DATA

Some additional comments on sulphonamide therapy in a few of the diseases listed in the table on pages 285-6 may be of value —

Erysipelas — There is no doubt that the duration and mortality rate of the acute form of erysipelas have been materially reduced since the sulphonamides were introduced. Except in old and feeble persons and in those with serious organic disease, the death rate is now almost nil (Snodgrass and Anderson, 1937, Rantz and Keefer, 1939, Hoyne, Wolf, and Prim, 1939, Shank, Maxwell and Bozalis, 1941, Siegel, Rosove, and Bower, 1942).

Chronic streptococcal dermatitis with recurrent erysipelas — Efficient local treatment of the foci of infection in the skin (intertrigo, fissures in the folds or at mucotaneous orifices) is essential, but sulphonamide therapy, if employed judiciously, may be of great value.

One patient under my care, who after an attack of scarlet fever had suffered for sixteen years from widespread streptococcal intertrigo, and had had five attacks of erysipelas, recovered quickly and permanently under treatment with sulphanilamide when local measures had failed to prevent relapses.

It would, however, be dangerous to assume that elephantiasis result from the recurrent attacks of lymphangitis. The prospect of complete cure is uncertain. In such cases I rely chiefly on *intramuscular* injections of streptococcal vaccine given over a long period, but sulphonamides should be tried. Mercer (1939) records a successful result in a case of recurrent lymphangitis with elephantiasis of the upper lip treated with sulphanilamide, 20 grains per diem, for three periods of two months' duration. I prefer to give short intensive courses with intervals of rest, if the patient can be closely observed.

Impetigo contagiosa — The bacteriology of this disease will not here be discussed. The eruption in its typical form is, as Sabouraud maintained, primarily caused by *Streptococcus longus*, secondary invasion with *Staphylococcus aureus* occurring frequently. The circinate or gyrate form, and certain types of bullous impetigo, including pemphigus neonatorum, appear to be primarily staphylococcal.

As regards sulphonamide treatment, different opinions are held — (1) Some consider that, since the eruption is curable by other methods, the sulphonamides should not be prescribed either locally or internally; (2) others regard topical therapy with sulphathiazole or sulphadiazine as so effective that oral administration

is unnecessary and unjustifiable, (3) others, like myself, prefer alternative method of local treatment, but in severe or resistant cases prescribe a short intensive course of sulphathiazole internally as described above, and, finally, (4) there are some who combine local and internal treatment with sulphathiazole

I am much indebted to Dr Laurence Martin for permission to record his experience of 250 Service cases treated exclusively with sulphathiazole. His findings and conclusions are briefly as follows—(1) The combination of oral and local treatment is statistically better than either alone, (2) the optimum oral dosage is 24 gm in four days (2 gm thrice daily), (3) 5 per cent paste is probably the best form of local application, (4) with this combined treatment cure is obtained in about 8.5 to 9.0 days, (5) no case of sensitivity to sulphathiazole has been observed in primary impetigo, but *sensitization occurs frequently with either local or oral treatment in cases of impetiginized eczema*

A point of interest is that Dr Martin does not allow the crusts to be removed, since "they dry up and drop off in 48 to 72 hours" with the combined treatment, whereas Lt-Col Pillsbury and others stress the importance of their frequent and thorough removal when local applications of sulphathiazole or sulphadiazine in paste or cream are employed alone

Dermatitis herpetiformis (Dühring's disease)—The causation of this disease and its relationship to pemphigus vulgaris are still a matter of controversy. Some insist that it is essentially benign, whereas pemphigus is almost invariably fatal, but there are cases in which in the early stages the eruption has all the characteristics of dermatitis herpetiformis but gradually assumes those of the more serious disease. Both conditions, to my mind, like lichen planus, possess the hall-marks of virus infection, although this has not been proved as yet. The provocative effect of potassium iodide, and to a less extent of bromide on dermatitis herpetiformis supports this view, since the activating influence of certain drugs upon known viruses (the biotropism of Milan), such as those of herpes simplex and zoster, is well known. These two eruptions and lichen planus appear not infrequently during medication with injections of arsenical compounds and gold, and zoster occurred in epidemic form during the outbreak of arsenical poisoning in Manchester in 1900.

As regards the influence of sulphonamides on dermatitis herpetiformis, the fact that sulphapyridine is far more effective than sulphanilamide, and than sulphathiazole or sulphamezathine, would point to the disease being due to a specific infective organism, if not necessarily a virus. The same is true of pemphigus. It is common experience, however, that both diseases relapse when the drug is discontinued. In some cases of dermatitis herpetiformis, after an initial short course of full doses, I have succeeded in keeping the patient almost free from his eruption by prescribing one tablet daily or even every second or third day, and no toxic effects have so far been observed.

Lupus erythematosus—Since it was first suggested (Barber, 1915) that this disease might sometimes be an acute or chronic reaction of the skin to streptococcal infection, this view has received considerable support, and my experience has not altered the opinion I then expressed that some cases are of tuberculous and others of streptococcal origin. I hold the same opinion concerning a group of eruptions

that may be regarded as related to lupus erythematosus, viz erythema nodosum, erythema induratum, and granuloma annulare I have discussed this question elsewhere in detail (1929, 1940, 1941)

The treatment of the streptococcal form of lupus erythematosus with sulphonamides presents features of peculiar interest and difficulty owing to the severe reactions, distinct from drug fever, that often occur (Barber, 1941) Several other observers have reported cases treated by this method with varying results (Hruszek, 1939, Weiner, 1940, Wile and Holman, 1940, Probert, 1940, Combes and Canizares, 1941)

My own procedure is first to investigate each case fully in order to determine if possible whether tuberculous or streptococcal foci of infection are present If it is decided that the eruption is probably of streptococcal origin, closed foci are dealt with and sulphonamide therapy is instituted I now prescribe a short course of not more than a week with full dosage, and repeat this at intervals if necessary, but I seldom undertake such treatment in this disease unless the patient is prepared to remain in bed under close observation *In the acute form of the disease, however, extreme hypersensitiveness to sulphonamides is almost always present, and minute doses should be given at first until the patient's tolerance is determined These cases, as is well known, often terminate fatally with streptococcal septicæmia*

Erskine (1938) and I consider that particularly in lupus erythematosus some of the reactions caused by the sulphonamides, e.g., a scarlatiniform erythema, are due not to the drug, but to liberation of streptococcal toxin from foci of infection.

One point of some interest, which I have not seen recorded, is that thoroughunction daily of patches of lupus erythematosus with a 5 to 10 per cent. ointment of sulphanilamide in lanolin will in some cases produce striking improvement As a rule this is preceded by a reaction in the eruption comparable to that which may occur when sulphonamides are given orally I have never seen epidermal sensitization, i.e., an eczematous reaction, result from such treatment

SUMMARY

(1) The sulphonamides are effective in the treatment of certain diseases of the skin, both when given internally and as local applications

(2) Both methods of administration demand the most careful surveillance owing to the risk of allergic hypersensitiveness of the skin and other tissues, and of serious toxic effects on the liver, kidneys, and hæmatopoietic system

(3) It is important to distinguish between allergy with normal excretion of the drug and toxæmia with drug retention In the former, desensitization can be achieved by further administration, in the latter, it is imperative to discontinue the treatment

(4) The risk of allergic hypersensitiveness and of toxæmia is minimized by prescribing the drugs orally for short periods only (three to seven days), and by applying them locally for not more than five days

(5) It is questionable if, as has been claimed, the use of sulphonamides as local applications in superficial infective dermatoses, such as impetigo contagiosa,

possesses any advantages over rational treatment with older and safer remedies. In any event, long-continued topical therapy with sulphonamides should never be permitted.

(6) The diseases of the skin for which the oral administration of sulphonamides has been employed with complete or partial success may be divided into (a) acute and chronic infections of the skin itself with various micro-organisms, and (b) certain toxic eruptions due sometimes or always to acute or chronic infection situated elsewhere than in the skin.

(7) In some diseases the efficacy of one member of the sulphonamide group may be greater than that of the others. It is well known, for example, that sulphathiazole is more effective than sulphanilamide in staphylococcal infection, and sulphapyridine appears to be the drug of choice in dermatitis herpetiformis, pemphigus vulgaris, and pemphigus vegetans.

I am indebted to Brig-Gen. R. M. B. MacKenna, R.A.M.C., for valuable help in preparation of this article.

References

- Barber, H. W. (1915) *Brit J Derm Syph*, 27, 365
 — (1929) *Lancet*, 2, 483
 — (1931) *Guy's Hosp Rep*, 81, 92
 — (1940) *Lancet*, 1, 583
 — (1941) *Brit J Derm Syph*, 53, 1, 33
 Cohen, E. L. (1942) *Brit med J*, 1, 359
 Combes, F. C., and Canizares, O. (1941) *Arch Derm Syph*, 44, 236
 Erskine, D. (1938) *Brit J Ven Dis*, 14, 39
 — (1939) *Brit med J*, 2, 104
 — (1941) *Guy's Hosp Gaz*, 55, 324.
 — (1942) *Lancet*, 2, 568
 Hoyne, A. L., Wolf, A. A., and Prim, L. (1939) *J Amer med Ass*, 133, 2279
 Hruszek, H. (1939) *Derm Wschr*, 108, 162
 Mercer, S. R. (1939) *Arch Derm Syph*, 39, 1042
 Pillsbury, D. M., Wammock, V. S., Livingood, C. S., and Nichols, A. C. (1941) *Amer J med Sci*, 202, 808
 — Sulzberger, M. B., and Livingood, C. S. (1943) "Manual of Dermatology," Philadelphia and London, 314
 Propert, S. A. (1940) *Lancet*, 2, 5
 Rantz, L. A., and Keefer, C. S. (1939) *New Eng J Med*, 221, 809
 Sams, W. M., and Capland, L. (1941) *Arch Derm Syph*, 44, 226
 Shank, R. E., Maxwell, R. W., and Bozalis, G. S. (1941) *J Amer med Ass*, 117, 223
 Siegel, L. S., Rosove, L., and Bower, A. G. (1942) *Ann int Med*, 16, 262
 Snodgrass, W. R., and Anderson, T. (1937) *Brit med J*, 2, 1156
 Steigman, A. J. (1942) *Ibid*, 1, 12
 Tate, B. C., and Klorfajn, I. (1944) *Lancet*, 1, 39
 Weiner, A. L. (1940) *Arch Derm Syph*, 41, 534
 Wile, U. J., and Holman, H. H. (1940) *Ibid*, 42, 1059

SCABIES

By HENRY MACCORMAC, CBE, MD, FRCP

Physician for Diseases of the Skin, Middlesex Hospital

"I now set about erecting a hut for myself and wife, resolving if possible not to mix blankets with so many bedfellows again. This I was the more anxious to do because at that time the whole of the men were affected with an eruption of the skin similar to the itch."—Sergeant Anton in "Wellington's Men, Some Soldier Autobiographies" Edited by W H Fitchett London, 1912

MRS BEETON is supposed, quite untruly of course, to have prefaced her receipt for juggling by "first catch your hare." The preoccupation of the dermatologist may lead him into a similar train of thought. "first catch your scabies," a surprisingly simple issue upon which there is surprisingly little agreement, but one which nevertheless holds the key to and controls everything that will be discussed in this article.

In some quarters the complete answer seems to have been found in the sleeping partner—an important factor, no doubt, but only one among several. Therefore as a beginning and merely as a basis for discussion I shall here recall that Small and I credited blankets and underclothing, "mangy" horses, and infected women, as the chief source of scabies in the Army in France during the war of 1914-1918. These separate conditions can again be considered, but in a reverse order, leaving out horses because, mangy or otherwise, they have been replaced by tanks and jeeps. Scabies may be, and sometimes is, truly venereal in origin, meaning by that contact, and undressed contact, with a harlot in her bedroom—not the alfresco congress which as it may be considered the removal of railings from parks and other open spaces has made increasingly possible. Although venery plays a part in disseminating scabies, it is in another sense that the sleeping partner continues to be an active agent in spreading disease as in the following imaginative but not improbable sequence—

An honest housewife contracts scabies but six weeks may elapse before the signs mature, and frequently a month more before their nature is recognized. During this ten-week period she contaminates her husband on his leave, her sister who has stayed with her, and her evacuated children to whom she has made a country visit—and from each of these sources new foci of disease develop and spread, a sort of ferocious scabietic metastasis which could have been effectively prevented by early diagnosis and treatment.

How the honest housewife caught the itch, however, has yet to be explained. Experience and the practising of medicine have shown that prolonged and intimate contact with a contaminated person or thing are necessary conditions for infection. But for months before the events imagined above no one, it is presumed, had stayed with her, nor had she been away from home, she is not whorish or dissipated, and unless enlightenment comes by way of some sort of symbolic haruspication, or in some other manner, then the theory of infected blankets and clothing has to be investigated. On this question, of fomites as instruments of infection and re-infection, the distinguished investigations carried out by

Dr Kenneth Mellanby and his co-workers have completely reversed the long accepted opinion and have shown that the supposed infectivity of fomites has been greatly exaggerated, and that the risk of contamination from them is, within reasonable limits, negligible. Whether Hebra should be picked out, as is so often done, as an enlightened exception who in 1868 maintained that blankets played little part in the spread of the disease and that their sterilization was unnecessary is much open to question. Blankets are never mentioned by Hebra either directly or by implication. He talks of personal clothing, modestly stating his *personal* opinion in which he clearly does not believe, for he orders clean linen after treatment and entertains his readers with a version of the Biblical story in which he converts Naaman's leprosy into scabies, as the disease passed to Gehazi. It has been, because scabies is "communicable by contact and by wearing the clothing of those affected by it." If there has been no personal contact with another patient there is still no answer to the question "where and how did the patient pick up the disease?" Mellanby allows that "bedding is certainly able to transmit scabies" and that "communal blankets used by fire-watchers offer some risk," to which I am bound to add in fairness to him that these sentences have been taken out of their context which shows that he regards such risks as negligible, and that he has provided good evidence in support of his thesis. I leave the reader with an interesting problem which he and I will endeavour to solve "on the basis of an analysis of the facts which come under observation in the rough and tumble of practice."

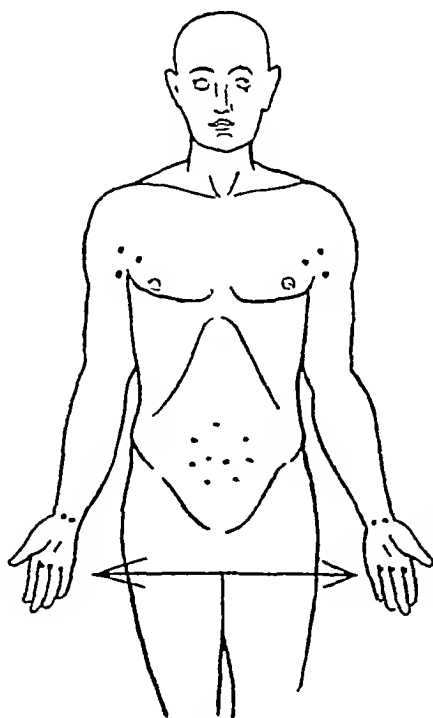


FIG. 1
Distribution of primary scabies

TYPES OF SCABIES

Scabies is noticed in three forms—uncomplicated or straight scabies, scabies complicated by pyoderma, scabies complicated by eczema or dermatitis. In these varieties, diagnosis relies upon the type of the eruption and its distribution.

Uncomplicated (straight) scabies—The types of lesion are present—(1) the scratch or follicular papule of which most of the eruption is composed, (2) vesicles, (3) burrows, that is to say curved or angular lines representing the tunnel made by the parasite, which can often be seen at once as a speck just under the surface. Scratched papules are collected and grouped about the anterior axillary folds, and on the abdomen in a circle centred by the umbilicus. A raised reddish round or oval blot is often observed on the axillary skin and rim of the navel, a most characteristic reaction of the sensitized scabietic skin. The pin-head vesicles and the burrows are most numerous on the hands and wrists, especially on

bs of the fingers. Ankles and feet are sometimes similarly involved. By contrast, the back is relatively free, and the face is not affected, except rarely in infants. The observer should be prepared to find many gaps in this typical regional distribution. A detailed and complete examination is therefore required before a conclusion is reached. In the adult male, lesions on the penis (and scrotum) provide a valuable aid to diagnosis, just as the presence of burrows on the palms and soles of infants serves to clinch the diagnosis in an otherwise obscure eruption. *Scabies complicated by pyoderma*—Impetiginous sores form on the lower buttocks, elbows and knees. Indeed a grouped impetigo on the lower buttocks can have only one interpretation and its paramount importance as an aid to diagnosis cannot be too strongly emphasized. It is often present and fully developed in infants both male and female when the eruption elsewhere is sparse and doubtful,

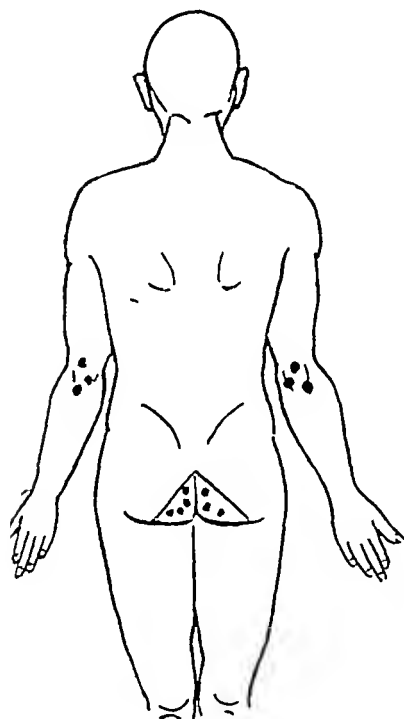


FIG 2
Distribution of secondary impetigo
in scabies

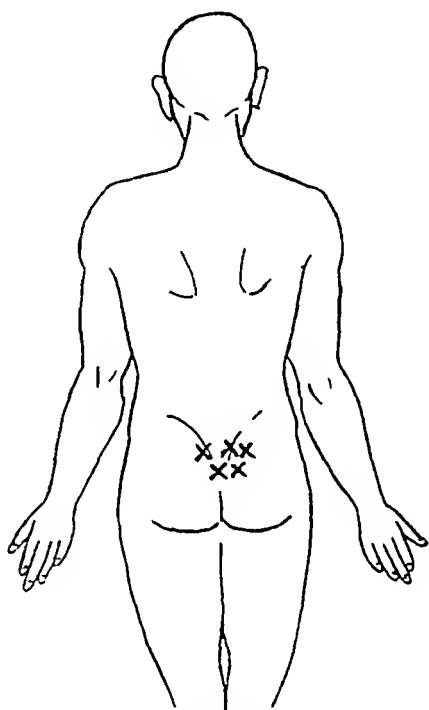


FIG 3
Lacerated back: distribution of secondary
impetigo in pediculosis

A simple and all-sufficient key to a difficult problem, which only needs looking for in pediculosis the *upper* buttocks (and lumbar regions) are similarly selected by impetigo. As the statement is sometimes made that scabies affects the buttocks without further qualification, attention is here called to this all-important distinction.

Scabies complicated by eczema or dermatitis—A potentially eczematous subject is able to develop slight or extensive eczema or dermatitis from the irritation

caused by the parasite, that is independently of any external application whatsoever, and these cases are usually and improperly classified by the careless observer as examples of sulphur dermatitis. Dermatitis is also met with when sulphur or some other sarcopticide has been used or abused, the results of under-treatment or over-treatment. In these cases the eruption is liable to be marked over friction areas—the shoulders and outer thighs and the waist—giving a hint of underlying parasitic disease which the alert scabies-minded practitioner will not miss.

Finally, in any of the above cases if a burrow can be found and a mite is removed for microscopic examination, this establishes the diagnosis beyond question. For those who may not be expert with the needle and lens the following alternative procedure is recommended —

The whole contents of the burrow are scraped out with a small curette, mixed on a slide with a drop of liquor potassæ, covered with a slip and examined under a $\frac{2}{3}$ objective. By this means the mite, or her eggs, or both are usually found easily.

DIFFERENTIAL DIAGNOSIS

Consideration should first be given to *industrial dermatitis*. Both scabies and many kinds of trade eczema affect the hands, but the first is usually polymorphic with the pathognomonic burrow, and the second is usually eczematous. Scabies has also its characteristic elements elsewhere. The consequences of a mistake are most unfortunate, because the workman is thereby prevented, perhaps for weeks, from working and earning wages.

Syphilis comes next in order, for it will be appreciated from what has been said above that when scabies has a venereal origin a scabid lesion on the penis developing some four weeks after sexual congress must at least possess the element of suspicion as to its nature. Scabies itches, syphilis does not, and there should be present elsewhere other manifestations of scabies. It is clearly possible to find both conditions represented at the same time, therefore it is prudent if any doubt exists to make all the necessary investigations, such as an examination for spirochætes and a series of Wassermann tests.

In *cheiropompholyx*, the third condition to be considered, the sago-grain vesicles on the hands and wrists are usually more deeply seated, more numerous and more difficult to rupture. Nevertheless, to exclude scabies may at times be far from easy.

Finally, *lichen urticatus*, the papular urticaria of young children, should be included in order that it may be excluded.

TREATMENT

Warfare has always been accompanied by epidemics of scabies, as Dr R. Friedman has so convincingly proved in his remarkable monograph on this subject. In the present war, scabies has followed this historic rule, the slight increase which preceded hostilities being suddenly converted into a formidable epidemic after 1939. The planners most courageously, and quite properly on the look-out for new methods of treatment, discarded such old-fashioned remedies as sulphur

ointment, and the like, for rotenone emulsion, derris root lotion, sulphur soap lather, and sprays of "hypo" and hydrochloric acid Mellanby testing out these different procedures showed that they were incompetent in varying degrees His investigations gave pride of place to sulphur ointment and benzyl benzoate emulsion, each with an efficiency rate of approximately 100 per cent Aladdin's old lamp had proved best after all

The traditional treatment of scabies required three separate stages first a warm soap bath in which the burrows were scrubbed open, secondly the application of the selected medicament all over below the neck upon an agreed number of occasions, and thirdly disinfection of contact day and night clothing, and bedding The researches of Mellanby and his collaborators have thrown considerable doubt upon the necessity for the first and last stages, the assumption being that the parasitocides, and in particular benzyl benzoate emulsion, can penetrate and destroy both mites and ova on and in the skin, and disinfest clothing and bedding used after the application has been made to the patient's body

From what has already been said it is clear that two sarcopticides have a sufficiently high efficiency index, viz *sulphur ointment* in one of its various forms, and *benzyl benzoate*, both vintage stock for, although this is rarely mentioned, benzyl benzoate has been in use for some fifty years and was recommended for the treatment of scabies by both Radcliffe-Crocker and Malcolm Morris Because ointment bases are in short supply and are hard upon clothing, benzyl benzoate emulsion containing 25 per cent. of the active principle, 2 per cent. lanette wax and water to 100 is standardized as a war-time measure Unless the patient attends a scabies centre, treatment is usually more conveniently carried out at bedtime in the following manner —

A preliminary bath is taken, after drying, the selected medicament is rubbed in or brushed all over the body below the neck, and the patient then gets into bed If sulphur ointment (B.P.) is used it is applied on three consecutive nights, benzyl benzoate emulsion is, however, only used twice, either on two consecutive nights, or the second treatment being given one week after the first Although there are conflicting views held, there can be no harm in washing and ironing contact garments and sheets and blankets It will be noted that with both sulphur and benzyl benzoate a preliminary bath is taken, that the remedy is applied all over below the neck, and that some simple method of disinfection is recommended

Both procedures are curative and should probably reach 100 per cent under the best conditions It is nevertheless true that in my special scabies clinic, where benzyl benzoate is exclusively employed, a recurrence rate of just over 2 per cent has been observed, attributable, as it has seemed, to failure from time to time to treat the whole family unit This gives point to the rule that all the members of the household should be treated, certainly in hospital practice, and the sleeping partner invariably, the mass attack being delivered at the same time for all, in order to avoid overlapping and reinfestation Patients are often inclined to over-treat themselves, with no advantage, but thereby certainly increasing the risk of post-scabietic dermatitis Renewed itching is a warning against further active remedies, and soap and water, and calls for rest and the application of simple ointments or creams

Scabies complicated by eczema is a major dermatological problem. With care it is possible to work in three sulphur or two benzyl benzoate rubs, not as a consecutive series but at intervals, using, say, boracic-zinc ointment at all other times. For straight scabies in infants, whose tender skin demands special consideration, half-strength sulphur ointment is used following the three-day plan. And the practitioner will not forget the adult with whom the infant is associated. When *impetigo* is present, unless it is severe and extensive, it is usually best to treat the scabies first and then the *impetigo*. The secondary infection responds readily to 1 per cent gentian violet paint, or 2 per cent ammoniated mercury and zinc paste, removal of crusts or scabs being called for when they prevent the remedy from reaching the underlying disease.

CONCLUSION

In this article I have dealt with scabies as met with in practice, not as a Public Health matter, for this is entirely beyond my competence. The patient either has or has not scabies and therefore it is best as clinicians to keep to this simple issue, believing that by early diagnosis and early treatment the epidemic will eventually be suppressed.

The "doctor-patient" relationship requires the practitioner to select for his patient a method of treatment calculated to give the highest cure rate; this may differ from the Public Health procedure when a community is under consideration and a variety of complicating circumstances call for a mass attack rather than individual attention. Nevertheless, in all cases, that is, both in public and private practice, treatment is far more likely to succeed and to cure if a trained nurse or orderly supervises and assists in the routine procedure, because even the most intelligent patients—and scabies is no respecter of persons, attacking the mentally alert and the cleanly or the dirty—are apt to forget or misunderstand verbal instructions given at the consultation at a time when the mind is not in its most receptive mood. For this reason written or printed instructions with exact directions are always well worth while.

Finally, if it is always remembered that scabies is at the present time a common disease, and if a constant watch is kept for it, even in unexpected quarters, it is unlikely that it will be missed or overlooked.

References

- Friedman, R (1941) "Scabies Civil and Military," New York.
 Hebra, F (1868) "Diseases of the Skin" 2. New Sydenham Society, London.
 MacCormac, H, and Small, W D D (1917) *Brit med J*, 2, 384.
 Mellanby, K (1943) "Scabies," Oxford.
 Morris, M (1911) "System of Medicine" (Allbutt and Rolleston), vol 9, London.
 Radcliffe-Crocker, H (1903) "Diseases of the Skin," Philadelphia.

THE CAUSES AND TREATMENT OF ACUTE DERMATITIS

By J FERGUSON SMITH, M D

Physician for Diseases of the Skin, Glasgow Royal Infirmary, Lecturer on Dermatology, University of Glasgow

AT the outset I feel that I ought to define my subject, and at the same time plainly that I propose to be rather dogmatic in my statements, and to describe those methods which I have found most useful, without attempting to disentangle the small part which is original from the large part which is borrowed from many sources

CAUSAL FACTORS

Irritants and hypersensitivity—Dermatitis may be defined as the reaction of the skin to an irritant, and the irritant may reach the skin from without or from within. The external route is the more frequent, but even gross chemical irritants—*neosalvarsan* is an example—may reach the skin from within, and more subtle biochemical substances, perhaps manufactured inside the patient's body, may evoke that form of dermatitis which is called *eczema*. There are some substances—mustard-gas, for instance—which will provoke dermatitis in most persons, but in the majority of cases of dermatitis encountered in practice the exciting cause is a substance which most skins can tolerate, but towards which the patient's skin is abnormally sensitive. And here it must be emphasized that in classifying skins as "sensitive" or "insensitive," and substances as "irritant" or "non-irritant," there are no water-tight compartments, but all intermediate grades can be found. It is generally recognized, however, that some people are much more likely than others to become supersensitive towards one or more substances, and such individuals are commonly referred to as belonging to the "sensitizable class." Supersensitiveness towards a substance may possibly be inborn, but it is most often acquired. What is inborn, and often inherited, is the liability to become sensitized. Hence the importance of family history in the prognosis of *eczema*.

How, then, is supersensitiveness acquired? Long-continued exposure, exposure to a high concentration, exposure to the usual concentration after some previous damage to the skin—all these are possible ways. Often a slight dermatitis is set up in one of these ways, attracts little attention and soon heals, but when the patient again meets the irritant a much more severe dermatitis results. Supersensitiveness is usually highly specific, and tends to last for long periods, often probably for life. Frequently the skin on parts unaffected by dermatitis is no more sensitive towards the general run of irritants than is that of normal controls, but in other cases, particularly those described as "*eczema*," there may be a general irritability of the skin.

Allergy—"Eczema" has already been defined as that form of dermatitis which we believe to be caused by subtle, biochemical substances, elaborated inside the patient's body, and reaching the skin from within, and often the irritant is manufactured in inflamed or otherwise damaged skin, as by burning or abrasion. On this view, eczema frequently arises out of an originally localized "contact dermatitis, and every fresh patch of eczema is a fresh manufactory of the allerger so that the disease, in popular phraseology, "feeds on itself." In other cases the patient has become supersensitive towards micro-organisms, their toxins, or possibly products of their interaction with the tissues. Streptococci and hyphomycetes are the most common offenders, but in a few formidable cases it has been possible to demonstrate allergy to *Staphylococcus aureus*. The acute bullous dermatitis of the hands (sometimes also the feet) which is called cheiropompholy is certainly sometimes caused by allergy towards epidermophyton, probably sometimes towards pyogenic cocci, and perhaps sometimes towards an autogenous allergen. The last is hard to prove, but it does seem in some cases that a substance accumulates in the system, and when it reaches a certain "head" the eruption occurs. That food proteins may excite eczema is widely held, but again I have no evidence that they ever do, although they may at times aggravate an existing eczema.

Broadly speaking, acute dermatitis from the action of an external irritant will be confined to the areas which have been directly exposed to it, conversely, if the eruption affects parts which presumably were not so exposed, then internal factors playing at least a part in the causation, should be suspected. Often in such cases a carefully taken history will reveal a local origin for the condition.

IRRITANTS

It would be a colossal task to catalogue all the agents which have been incriminated as causes of acute dermatitis, and even in the larger textbooks the lists are far from exhaustive. It is, in fact, a sound assumption that there are few substances in Nature which are completely incapable of causing dermatitis. Among the most acute cases are those caused by certain plants. Primulas, particularly obconica, and the Rhus tribe, particularly the American poison ivy, are the best known. A recent American book lists 113 plants, and 106 trees, which have been recorded as causes, and these lists are to my own knowledge not exhaustive. Incidentally plant dermatitis seems to be much more frequent in North America than in Britain perhaps because the population there is largely derived from stocks which have not been in contact with the indigenous flora for more than a few generations at most. None the less, cases due to chrysanthemum, pyrethrum, geranium, bulb plants, and such weeds as milfoil, are occasionally seen in this country. With some plants, such as wild parsley, subsequent exposure to sunlight is necessary for the production of dermatitis.

Dyes, drugs and cosmetics also may cause dermatitis of the most acute type. Paraphenylenediamine, which continues to be used for dyeing furs, and also for human hair, and occasionally eyebrows and lashes, and moustaches, because by varying the degree of oxidation it is possible to get a wide range of tints, is a very

powerful sensitizing agent, and the dermatitis set up by it may not only be severe locally but may spread all over the body, and may last for months. Many other dyes may cause dermatitis, but acute dermatitis from them is not so common.

Supersensitiveness to drugs, whether these are used as topical applications, or reach the skin only incidentally, is frequent. Resorcin, mercurials, carbolic acid and all the coal tar antiseptics, salicylic acid, sulphur, iodoform, iodine itself, chrysarobin, dioxyanthranol, the sulphonamides—these are only a selection from a long list. I have seen acute dermatitis of the genitalia from the use of a contraceptive preparation containing mercury, and afterwards in the same subject an equally acute dermatitis from a white precipitate ointment, used for impetigo of the face. Atropine to the eyes, and benzedrine in a nasal spray may produce severe local dermatitis. The organic arsenicals given by injection may cause the most formidable general dermatitis, as may gold compounds, and rarely bismuth. Drugs by the mouth, particularly some of the barbiturates, may act similarly, although fortunately not often. Liniments and counter-irritants are common offenders.

Cosmetics are an important group. Hair dyes have been mentioned, and I would only add that most of them contain paraphenylenediamine, no matter the name under which they masquerade. With face powders the orris root, the colouring matter or the perfume may be to blame. I have seen a patient exquisitely sensitive to powder of a well-known brand, of a certain colour and perfume, and tolerant of the same brand and tint, but with a different perfume. In lipstick the dyes, particularly eosin, are responsible. With nail varnish sometimes the fingers are tolerant, but the face is affected where the fingers have touched it. Depilatories on face or axillæ, anti-perspiration lotions on axillæ, "liquid stockings" on legs—all these give occasional trouble.

INDUSTRIAL DERMATITIS

It may have been noticed that so far no mention has been made of occupational dermatitis. The reason is, of course, that this is comparatively seldom acute. Cement and other lime compounds, paints, oils, chrome, alkalis, explosives, tanning compounds, French-polishing and leather-finishing fluids, "improvers" in flour, and a great army of other substances cause commonly subacute or chronic dermatitis, but an occasional acute case from one of them does crop up. Fairly acute dermatitis is seen in groups of dock labourers from soda-ash, and from the dust of copra, which proved to be a mass of mites and small beetles, alive, and in various stages of disintegration. Hard woods, much used by shipyard carpenters, may at times cause acute dermatitis. To conclude this necessarily incomplete survey, such curious causes as nickel, used in suspender-fasteners or wrist-watches, and modern plastics, used for spectacle-frames, may be mentioned.

DIAGNOSIS

The determination of the cause of an acute dermatitis is obviously of the highest importance, and precise history taking is the first essential. Close cross-examination

of the patient may reveal what he does not volunteer, but quite often nothing even suggestive can be elicited, and in that event there is nothing to be done but wait and see if there is a recurrence. If there is no recurrence, and the cause of the single attack remains shrouded in mystery, that is no great matter for worry. If there are recurrences, then there are opportunities for detective work.

Patch tests—If even slight suspicion falls upon some substance, patch tests should be done. The technique has often been described, and is probably familiar to most readers, but it is well to give it briefly here —

With most soluble substances, a 1 per cent watery solution should be made, a piece of well washed linen, not larger than a postage stamp soaked in it, applied to the skin at a point well away from the areas of dermatitis, covered with rubber sheeting, and kept on by means of plaster or a bandage. With substances known to be very irritant, higher dilutions should be used. Oily bodies can be used undiluted, and covered in with grease-proof paper. Solids, such as nickel, can be applied directly, and kept on with plaster. For furs and textiles, take a snippet from inside, wet it well, apply, and cover with rubber sheeting. Leaves and petals of plants can be applied directly, under plaster. In every case controls should be done, using other substances or plants. When a number of substances have to be tested, they will act as controls for each other. Inspect the sites every twelve hours, up to forty-eight hours, and remove the patch at the first sign of a positive reaction. There should be papulo-vesicular, not just erythematous, and the controls should be negative.

These tests are not entirely free from possible fallacy, but they are sufficiently reliable for practical purposes, and they are sometimes extraordinarily specific as in the case of a midwife who correctly attributed the dermatitis of her hands to lysol. She reacted positively to the brand which she had been using, but not to either of two other brands, and she was able to avoid further trouble simply by changing her brand.

TREATMENT

General—In all but mild cases, rest in bed is one of the most valuable measures. It acts in a number of ways —by withdrawing, in all probability, the patient from further contact with the causal irritant, by lowering the metabolic rate generally, by making possible "messy" treatments which would be prohibitive with the patient up and about, and by avoiding sudden changes of temperature. This last is a point of real importance. The skin is, of course, one of the two main heat-regulating organs of the body, and when its function is impaired, the body cannot easily adjust itself to changes of temperature. A bedroom may be kept warm by day and allowed to cool at night, but the change is gradual, whereas the change on going from room to room may be abrupt. For this same reason care should be taken when using cooling applications to see that they do not cool to excess. Going to bed has often a good psychological effect. The feeling of having got down to it, and of being for the moment out of affairs, has a soothing effect, and conduces to cure.

As regards *diet*, alcohol, spices and condiments should be avoided, and tea and coffee taken neither very hot nor very strong, if at all, but otherwise I am sceptical of the importance of dieting. Considerable amounts of fluid should be given, and freshly-infused tea, not too hot, is as good a means as any to this end. I have tried salt-poor diets, but am unconvinced of their value. In many really acute

cases there is some malaise, perhaps from absorption of toxic bodies, perhaps from over-stimulation of the cutaneous nerves, and appetite is poor, but if appetite is good there is no reason why it should not be satisfied

Drugs—The influence of internal treatment is rather difficult to assess, because the natural tendency of the skin to recover when it is given a fair chance may easily delude into the belief that some drug has contributed to the cure. Nevertheless, the impression is gained that some good can be done by internal medication. Alkalis seem to reduce the irritability of the skin, such as 20 grains each of sodium bicarbonate and sodium citrate, t i d. Thiosulphates have been advocated as non-specific desensitizers. Sodium and calcium thiosulphates by intravenous injection are advocated but it is doubtful if they do any appreciable good. At present I often give magnesium thiosulphate, 15 grains, t i d, by mouth, perhaps combined with from 5 to 10 grains of sodium bromide. Bromide seems not only to lessen itching through its general sedative action, but also to reduce in some degree the excitability of the vasomotor nerves of the skin. French writers have advocated its use intravenously, and this also I have tried, but cannot say that I have seen any advantage over the oral route. I have also tried and discarded antimonial wine, which is an ancient remedy for acute eczema. In severe and extensive dermatitis, such for example as arsenical dermatitis, large doses of vitamin C appear to have a beneficial effect. 200 mgm of ascorbic acid may be given, three times a day, either by mouth or by injection. When itching is severe, stronger sedatives may be needed. The barbiturates as a class are rather uncertain in their action, but analgesics, such as phenacetin, phenazone and aminopyrine, often help, and the combination of the last named with a barbiturate, in the form of veramon, allonal, or a similar proprietary tablet may give great relief. In a really acute attack, when the problem is to tide the patient over two or three stormy nights, chloral hydrate is possibly best of all. A single dose of 15 grains is often enough. Opium and all its derivatives should be avoided like the plague. They are not very efficient against pruritus, any short relief is followed by a worse exacerbation, and the risk of habit formation is always present.

External treatment—When all is said and done, however, it is upon external treatment that most reliance is placed, and for this resource and judgement may both be required. In the most acute phase exclusion of external stimuli, so far as possible, should be the aim. The classical method for this is the *starch poultice*, and for many years it was my standard measure. I seldom use it now, because I think I can usually do better, but it cannot altogether be left out of account. The following method will be found convenient and good—

Take four tablespoonfuls of rice or corn starch powder and one teaspoonful of boracic acid powder; mix with a little cold water, then add a pint of boiling water, and stir until the mixture thickens. Lay pieces of butter-muslin on a marble washstand, let the starch cool until it shows signs of setting at the edges, then pour it on to the muslin. As it spreads out it will set almost instantaneously on the cold marble, and a layer thick enough for use is procured. A second piece of muslin is then put on top of the starch, and the dressing thus made can be bent and moulded on to the affected parts. Masks for the face can be made in this way. The dressings will keep for at least forty-eight hours, if kept in a biscuit tin. When there is much sepsis, 5 grains of proflavine may be substituted for the boracic acid with advantage. The poultices are renewed every four hours during the day.

Probably the method of choice, however, is the *wet dressing*. Many years ago French physicians advocated plain white lint, boiled, applied comfortably warm and covered in with waterproof material. This remains an excellent emergency treatment, but results are decidedly better when a lotion of 1 per cent tannic acid and 0.1 per cent salicylic acid is used to soak white lint, and applied under rubber sheeting as a wet dressing. This should be changed four-hourly, and it induces quicker improvement than anything else, this improvement is progressive for two or three days, when the case begins to hang fire and a change is indicated. When there is much crusting, and particularly in cases which are considered to be streptococcal, I use an oily lotion —

R. Ichthammol	120 grains
Prepared calamine	180 grains
Linseed oil	4 ounces
Lime water	4 ounces

This is used by shaking it well, pouring a little out into a saucer, soaking strips of cotton or linen rag in it, and applying them to the parts, using only a light bandage to keep them on. Lint is too heavy for this purpose, as it becomes almost waterproof with the oily fluid. No cotton-wool or other heavy dressing should be used, as the lotion must dry. The oil is sufficient to keep it from sticking. The dressings should be renewed twice daily.

When there are large blisters, as in cheiropompholyx, they should be punctured, and if they are purulent, the parts should be steeped for several hours daily in comfortably hot water, with 60 minims of strong solution of iodine to the quart. The oily lotion can be used between these steepings.

For rather mulder cases an excellent dressing is compound zinc paste, spread thickly on lint, and with a single layer of a good quality close-mesh gauze between the paste and the skin. This enables the dressing to be peeled off cleanly, without the use of oil or other detergent, and it must be stressed that zealous attempts at cleaning off old ointments often undo much of the good achieved by the previous dressing. The outside of the lint should be moistened with cold water; this can be repeated from time to time with advantage, and it makes frequent changes of dressing unnecessary. Once daily is usually sufficient.

In extensive cases, without a great deal of weeping, I rely greatly on "zincol" (from the German "zinkoel"), which consists of equal parts of zinc oxide powder and a vegetable oil, originally olive, but for some years rape-seed (colza), which is not only much cheaper, but pleasanter to the patient. Two per cent. salicylic acid is a useful addition to this. It is smeared on thickly, directly to the skin, and the parts are then covered with gauze or any thin dressing cloth. Fresh applications are made night and morning, and only occasionally, if uncomfortable caking occurs, is any attempt made to remove the old before applying the fresh.

It happens occasionally that a patient fails to tolerate, or at least to improve under any of the usual remedies, and it is well to have other resources in reserve. I have had occasional successes from milk of magnesia, applied as a cream and from a free dusting of the inflamed surface with plain starch powder. Fissan powder also may act well. At times, too, alternation of remedies seems to be more rapidly curative than the continued use of any one.

In deciding when to change the local treatment there are two good rules to follow. First, never change merely for the sake of change. It is usually wise to continue a method for so long as there is improvement, even though slow. Secondly, be guided by the hyperæmia. If the treated area has become paler, it is probable that the remedy is doing good. If, on the contrary, the red colour is deeper or brighter, go back to the initial treatment. Never be too proud to retrace steps, and be ready to listen to the patient. His feelings are often a good guide, and in the case of acute dermatitis it is highly probable that an application which does not increase his comfort is not doing any good.

When the dermatitis is of small extent though severe, or mild though extensive, calamine lotion may be the most convenient treatment, as it is not messy, and enables the patient to go about his business, but if it is used on large, acutely inflamed areas it will cause painful cracking. It is best used by being dabbed on, and allowed to dry, without any covering. A useful alternative in similar cases is the titanium greaseless cream, put up by British Drug Houses, under the name of "siccolam." In peace time this was put up in tubes, which are more portable than bottles of lotion. In peace time, too, lacto-calamine (Crookes) is more elegant and less drying than ordinary calamine lotion.

Once the acute phase has been tided over, more stimulating preparations are indicated. Sometimes the "zincol" will take the patient on to complete cure, but more often coal tar is indicated. I have had little success with any of the refined tar preparations, and prefer an ointment of 20 per cent each crude coal tar and zinc oxide powder, and 30 per cent each lanolin and soft paraffin. This is spread on, bandaged on, and changed once daily. Occasionally it has to be stopped on account of folliculitis, rarely because it irritates. If it be thought better to start with a lower concentration, 5 per cent coal tar may be put in the compound zinc paste and used like the plain paste, with the layer of gauze next to the skin.

Finally, X-rays must be given a place. If they are available, they are capable of much. Small doses, 50r, repeated every second day, are suitable for the acute case, and 60 to 80r, repeated twice a week, for the rather less acute. A total of 300r should never be exceeded without a longer pause, and it is rarely necessary to give nearly as much as that. I do not think that ultra-violet rays have any place in the treatment of acute dermatitis.

CONCLUSION

The treatment of the skin is an art, not a science, and the personal element plays a big part. I frankly fail with methods which others find successful, and I have no doubt that others fail with some which succeed with me. I have tried in this article to give simple and practical advice, avoiding the uncertain and speculative, to the best of my ability, and endeavouring not to confuse the reader by describing a multiplicity of methods.

ACNE VULGARIS

By JOHN T. INGRAM, M.D., F.R.C.P.

Lecturer in Diseases of the Skin, University of Leeds, Physician in Charge of Skin Department, General Infirmary, Leeds

ACNE VULGARIS is a common affection, as the name implies, and few civilized and socialized communities pass through the long years of puberty without experiencing something of this ailment. It is associated with the altered character and quantity of the sebum excreted and secreted on to the surface of the skin at puberty, which is responsible for a number of changes, the most remarkable of which is the development of immunity to the ordinary human small-spore ringworm infection of the scalp. There occurs an enlargement of sebaceous glands and pores, a coarsening of the skin with reactive hypertrophy of the horny layer, which is particularly marked in the skin lining the funnels of the pilo-sebaceous follicles from which the sebum escapes. As a consequence the pores of the skin are plugged with horn cells enmeshed with inspissated sebum and various non-pathogenic organisms, such as staphylococci and diphtheroids including the acne bacillus, form "blackheads" or "comedones."

This is the essential lesion of acne vulgaris and without it the diagnosis should not be made. Though generally black—as are most lesions characterized by hypertrophy of the horny layer—they may be white, they occur where sebaceous glands are most profuse and active, viz. face, ears, mid-chest and back, they block the outflow of sebum and it is as a result of this that indurated and pustular lesions of acne arise.

The face is pallid and greasy. Small cystic lesions—sebaceous milia—are seen. The blocked glands become sites of lowered resistance and secondary pyogenic infection readily occurs causing indurated papules, pustules and abscesses, often with resulting scars and sometimes keloid formation.

Rare complications, the nature of which is not fully comprehended, are the formation of "cold abscesses" and the low-grade, purulent, granulomatous destructive condition of "acne conglobata."

ETIOLOGY

Seborrhœic diathesis—Confining attention at first to the simple and common condition, it is seen to be no more than a normal physiological reaction of puberty. It is a minor accompaniment of the seborrhœic diathesis which in this degree is a normal pubertal state. The greater the disturbance occasioned by puberty the greater the seborrhœic variations from the normal, and the affection may sooner or later call for medical attention. What then are the pubertal influences which bear upon this state, since rational treatment must in large part be directed to such influences?

First in importance is the balance of androgenic and oestrogenic hormones in the circulation. It is suggested by Barber and Bishop (1943) that acne vulgaris of clinical degree is a male characteristic—an evidence of androgenic preponderance over oestrogenic hormone to be corrected by the administration of oestrone. Bishop has shown that the implantation of a crystal of oestrone may, within a few weeks, completely correct a gross acne (sometimes with the development of gynæcomastia in the male). There is unquestionably truth in this observation and it applies to both male and female cases, but it is only one of many etiological factors and cannot as yet be accurately interpreted in therapeutic terms. I have in many instances seen benefit in the male from the administration of stilboestrol 1 mgm daily for six weeks—and in the female from 0.5 mgm. for seven to ten days after menstruation. This treatment over a short period is within safe limits and merits usage in certain circumstances.

Equally important in the etiology of clinical acne are the *psychological and emotional stresses and strains* which accompany the pubertal and adolescent period. At this time responsibilities and anxieties in relation to work and play, to family and outside relationships, to religion and sex are many and assume unreal proportions. It is common to see exacerbations of acne on arrival at or on return from boarding school, on the approach of examinations or when embarking on a career. This aspect of the acne problem, which is more common and important than is supposed, merits careful attention, for the presence of the acne will itself create a further emotional embarrassment and, unless help and understanding are imparted, may do much psychological harm to the sufferer. Intelligent discussion of this aspect of the problem with the young patient is of value, and sometimes it is helpful and encouraging to prescribe luminal, $\frac{1}{4}$ of a grain every night, to curb hypersensitiveness.

Dietetic factors—There is no doubt that dietetic and gastro-intestinal behaviour can readily influence the behaviour of acne as of most seborrhæic ills. Such subjects do well on a diet rich in proteins and vitamins and somewhat restricted in carbohydrates, fluids and salt. The chief offence is an excess of carbohydrate intake combined with constipation. Seborrhæic subjects do not tolerate a high carbohydrate diet well and require a high intake of the vitamin B complex. Certain foods which commonly provoke acne should be avoided entirely, they are pig, cocoa and chocolate, cheese and fried fats.

It is true that *acute upper respiratory tract infections*, such as "colds," influenza, tonsillitis, commonly aggravate acne vulgaris and it would seem reasonable that chronic infection in nose, throat or mouth are similarly harmful and should receive attention. It should be noted that seborrhæic subjects are prone to sepsis of mucous membranes just as to skin sepsis.

The foregoing are the major factors demanding attention, so far as the background of the problem is concerned.

DIFFERENTIAL DIAGNOSIS

Just as the natural greasy secretions of the skin provoke acne so prolonged contact with oil and grease from outside sources causes "oil acne and folliculitis." Under war

the outpouring of sebum over a period of a few weeks. A course of three or four treatments at monthly intervals will maintain more normal functioning of the glands for some months and this habit may be maintained after the course. If it is not, such a course of treatment can be repeated once a year during the years of pubertal disturbance. X-rays should not, however, be employed as a cure for acne but merely as part of the local treatment and should be combined with the other necessary local and internal routine.

HORMONE THERAPY—Barber and Bishop (1943) have treated many cases of acne by œstrone therapy. The method of choice is the implantation of a crystal of œstrodial, 200 to 250 mgm., suggesting that saturation of the system with œstrogen is necessary to produce convincing results.

Severe pustular acne in the precocious young male is rapidly brought under control by this method. The gynæcomastia and suppression of libido which accompany the treatment disappear on removal of the crystal. Recurrence of the acne may be controlled later by oral therapy.

In females, those cases of acne seemingly associated with ovarian deficiency rather than with overaction of adrenals are more responsive to this treatment. Persistent acne about the chin at or after the menopause also responds well. Suppression of menstruation for two months followed by menorrhagia is a common accompaniment of saturation therapy in the female. The value of smaller dosage by mouth is as yet uncertain. Barber gives treatment during and for ten to fourteen days after the menstrual period, the dosage varying for individual cases (personal communication).

GENERAL MANAGEMENT

To review acne vulgaris in the light of the foregoing considerations it is clear that the problem should be approached not as a disease dependent upon the activity of pathogenic organisms or upon metabolic or endocrine disease but as a physiological expression which may under a number of influences become an embarrassment and call for measures of control. It is rarely that the expression cannot be controlled.

In the first instance the toilet routine must be satisfactory and dietetic indulgence common at puberty, must be curbed and regulated. Frequently emotional and psychological influences call for intelligent consideration. In some cases hormonal therapy may be indicated, though commonly endocrine dysfunction at this time is secondary to emotional and nervous influences. Among internal therapies the vitamin B complex may take a useful place, but it is doubtful if any other measures are of value unless there are particular indications. Thus in the anæmic, iron and copper may be prescribed and in the sluggish types with slow pulse and poor peripheral circulation a small dose of thyroid may be of value.

In pustular acne, or when there is much secondary infection, sulphonamide therapy is employed, e.g. sulphathiazole one tablet thrice daily after food, for ten days. Vaccine therapy is not indicated in the treatment of acne nor is it of any value.

It is generally supposed that the cold abscesses which sometimes complicate

acne vulgaris are infective in origin but this is doubtful. They would seem to be dependent upon some more profound influences, possibly endocrine. Their onset may be sudden and inexplicable, as may their passing. If they are incised nothing is gained and ugly keloidal scarring will result. It is wiser to be patient, avoid interference and pursue the general lines of treatment indicated. The phase will pass and the minimum of disfigurement will result.

The transition from the simpler seborrhœic manifestations, including acne, to the more complicated affections like sebo-cystomatosis, ulerythema sycosiforme (honeycomb acne), acne conglobata, which are inherited nævoid, familial affections, is not always well defined and the indolent pyogenic granulomatous ulceration seen in severe cases of acne associated with abscess formation probably belongs to the nævoid group. Although to some extent controlled by the measures indicated for acne and by sulphonamide therapy they may call for radical treatment, as by curettage or excision.

Susceptibility to acne vulgaris or to allied seborrhœic disturbances may be familial and inherited. The susceptibility is most marked between the ages of twelve and twenty years but there is great variation both in upper and lower limits. The affliction will sometimes persist well into the twenties and this is particularly true of the more sensitive, intelligent type of patient. Marriage commonly effects a cure, no doubt as the result of its stabilizing influence upon endocrine function and emotional balance. When acne persists in married life it commonly means lack of emotional and physical satisfaction, especially in the female.

Severe acne of the trunk may persist well into adult life in the male.

When the condition is associated with sebaceous cysts and persistent abscess formation—usually most marked about the neck and shoulders—surgical interference may be necessary. Preliminary treatment with œstrogenic hormone should be tried and it must be remembered that response to such therapy may be slow. X-ray therapy has some restraining influence on these severe cases but when cysts are present surgical removal has a certain place in treatment.

Tropical climates adversely influence the course of acne, which may be provoked to disabling proportions under such conditions, and this should be borne in mind in determining the category of a member of the armed Forces. Apart from tropical service, acne of the neck and back in soldiers may be of such a degree as to prevent their carrying out their routine duties in a combatant unit, the wearing of equipment, the friction of the tunic collar and vigorous exercises being contraindicated. Such severe acne can rarely be controlled for any useful period under Service conditions, partly on account of dietetic factors but mainly because of hormonal and psychogenic influences.

References

- Barber, H. W., and Bishop, P. M. F. (1943) (In the press)
Semon, H. C., and Herrmann, F. (1941) *Brit J Derm Syph*, 53, 177

staphylococcal skin lesion or an infective conjunctivitis should likewise be prevented from spreading the infection by being isolated at once and having a special nurse to look after them. Onychia is less likely to arise when any tags of skin at the sides of nails are regularly snipped off and the fingers gently dried with a soft towel to minimize the risk of producing small tears through which infection might enter. The first principle in the treatment of a case is the prevention of spread by contacting clothes and the infant's fingers. The lesions should be covered with gauze or lint. The next principle is to diminish the likelihood of satellite lesions developing by painting a large area of the surrounding skin with an antiseptic such as 1 per cent gentian violet or 1 per cent brilliant green in aqueous solution or anointing it with 1 per cent ammoniated mercury ointment. This should be done once daily. Pustules, boils and infected fingers should be painted once a day with one of the above antiseptic dyes, and also the affected areas of skin in bullous impetigo and pemphigus, after the raised skin has been completely removed. It is most important to remove every vestige of skin at the edges to prevent the lodgement of bacteria and the extension of the lesions. In cases of onychia each affected finger should have a separate dressing and the whole hand be kept in a glove to prevent infection of adjoining fingers and the infant's face. In all these types of lesion the affected parts should be kept dry with boracic and starch dusting powder. The use of gentian violet for more than two or three days often causes undue dryness of the skin, so it is advisable to replace it with either 1 per cent ichthyol paste or 1 per cent ammoniated mercury paste for a day or two after such a period.

Surgical measures are necessary in the complications of onychia and in the case of boils and abscesses. When a nail-fold infection develops, healing is greatly accelerated by packing the fold with a strand or two of lint to open it up and promote drainage. Suppuration of the nail-bed requires removal of part of the nail to facilitate drainage, and healing is hastened by removal of the whole nail when there is extensive involvement. Deep infections of the finger should be treated by a surgeon because of the risk of permanent disablement following treatment which is either surgically imperfect or too conservative. Boils require the application of hot boracic fomentations four-hourly after they show signs of coming to a head, and the same treatment should be applied to areas of cellulitis. Abscess formation develops rapidly in the new-born infant with cellulitis, and fluctuation can usually be elicited within two or three days. Free surgical incision is then indicated, and the insertion of a drain for twenty-four hours is often advisable to prevent the pocketing of pus and premature closure of the wound. Such a procedure is followed by rapid subsidence of the inflammatory process and the wound quickly heals. In the case of a breast abscess in a girl the radial incision must be made as far away from the nipple as possible to avoid damage to the main ducts of the gland.

Chemotherapy—It is doubtful if sulphonamide therapy confers much benefit in staphylococcal infections. There is no indication for chemotherapy in the milder forms of staphylococcal skin infection, which constitute the vast majority of cases, as recovery soon occurs with the simple measures outlined, but sulphathiazole in doses of $\frac{1}{8}$ to $\frac{1}{4}$ gm four-hourly for a few days is sometimes beneficial in cases of severe bullous impetigo, pemphigus and boils.

STREPTOCOCCAL DERMATITIS

Erysipelas is uncommon in the newborn. It produces a severe constitutional disturbance, if extensive, but may not be accompanied by pyrexia at this time of life. It shows the characteristic local features of severe erythema, hyperthermia, œdema, induration, a sharp demarcation line and, not infrequently, the formation of epidermal bullæ. The peri-umbilical and napkin areas are the most common sites, for the hæmolytic streptococcus may readily infect the dermis through the umbilical wound or ulcers in the napkin area. Birth abrasions and staphylococcal lesions afford other possible portals of entry.

Sulphamylamide therapy has completely revolutionized the prognosis, which formerly was grave. The drug should be started immediately, $\frac{1}{2}$ to $\frac{1}{4}$ gm being given four-hourly for two or three days, followed by half this amount until the condition has completely subsided.

No local treatment is required apart from the application of antiseptic dusting powder and a covering of dry lint.

OMPHALITIS

The careful aseptic precautions now taken with umbilical dressings account for the comparative rarity of septicæmia, which readily follows early infection of the stump of the umbilical cord. Slight infection of the wound which remains after separation of the cord is almost inevitable, but satisfactory healing occurs in the second week of life in the vast majority of infants. Infection of the wound by pyogenic organisms, notably the *Staphylococcus aureus* and/or the hæmolytic streptococcus, is the principal cause of delayed healing, and an excrescence of granulation tissue which forms a granuloma or polypus often develops in response to the infection. A serous or purulent discharge, however slight, hæmorrhage, however trivial, and the presence of a granuloma, should all be regarded as signs of infection. A rare type of umbilical polypus is that produced by the prolapsed mucosa of a persistent omphalo-mesenteric duct, but this is easily distinguished by its deep bluish-red colour, small central fistula and sometimes by the presence of faecal matter. Surgical treatment is indicated.

Slow mummification of the cord should be regarded as a sign of infection and it should be treated with rectified spirit and sulphonamide powder or 1 per cent gentian violet in rectified spirit. Manifest infection of the umbilical wound can usually be simply eliminated within a few days by instilling rectified spirit into the umbilicus twice daily and keeping it carefully washed and dried.

Polypi should be removed as soon as possible, for complete healing will not occur until this has been accomplished. Much the best way of quickly eliminating polypi, provided they are sufficiently pedunculated to be grasped by tissue forceps, is to tie a ligature tightly round the base to strangulate the blood vessels. The ligated polypus is covered with lint which is held in position with strapping, and within two days the withered polypus will have separated and the umbilicus will have healed. Most polypi can be treated by this method. If ligation cannot be carried out, daily cauterization with copper sulphate or silver nitrate will gradually burn down the excrescence. Care must be taken to touch the polypus for only a short time, prolonged application will melt too much of the salt, which may damage the healthy tissues round about.

SWEAT RASHES

Sweat rashes are common in the first few weeks of life, particularly in the early days when the temperature regulating mechanism is so unstable. Prickly heat (miliaria) is much commoner than sudamina. Both are caused by excess sweating.

Miliaria consists of an erythema produced by tiny red papules, some of which have a white summit owing to the development of a sweat vesicle. In the first two or three days of life, when it is too early for septic lesions to occur, these white lesions are often mistaken for pustules. The trunk is the most common site of miliaria. The application of a mild antiseptic dusting powder is the only treatment required and the condition clears up within two or three days. The vesicular lesions often dry up leaving small corns which eventually separate.

Sudamina only occurs when sweating is severe, as in high fever—notal pyelitis. The sweat appears to be free on the surface, whereas it is really contained in small vesicles covered by the thin, transparent, horny layer of the epidermis. The forehead is a common situation for this type of sweat rash. No treatment is necessary, for the fluid is soon liberated by the normal exfoliation of the horny layer of the epidermis.

NAPKIN RASH

Irritation of the skin in the napkin area is a common occurrence. A generalised erythema may be caused by coarse, rough napkin material, improperly washed napkins, or the use of an excessively alkaline laundry soap. More severe dermatitis ("sore buttocks") which does not usually extend to the peripheral parts of the napkin area and shows excoriation of the epidermis with oozing, or frank ulceration, is always caused by the action of the excreta on the skin. Loose stools are the principal cause of sore buttocks. The area of skin at each side of the anal region which overlies the ischial tuberosities is usually the first to become ulcerated and unless prompt measures are taken, sloughs may form in this area.

A great many forms of treatment are used for this condition. Treatment should first be directed to the feeding, particularly the prevention of over-feeding in the breast-fed baby, and the use of too much sugar or too rich a milk mixture in the artificially-fed baby. Rinsing of the dried napkins in a saturated solution of boracic acid or 1 in 5000 solution of mercury bichloride will counteract any bacterial action. The most important principle in the local treatment is to prevent, if possible, the stools from lying in contact with the skin. An adequate amount of Harrington or gauze should be used to soak up the stool as soon as it is passed. Preferably, no napkin should be applied and the buttocks left exposed with the infant lying on its side. Egg-white painted on the excoriated or ulcerated area forms an excellent protective pellicle which promotes rapid healing; it is assisted in severe cases by the preliminary application of 10 per cent sulphoaniline powder. In cases of erythema or mild excoriation 1 per cent compound ointment of benzoin in zinc and castor-oil cream is a suitable application.

ALLERGIC RASHES

Nettle-rash is commoner in infancy than at any other period of life and may arise at any time after birth. In infants, papules and vesicles often develop on the top of

the wheals. In the early days of life, the disease often takes the form of a generalized morbilliform rash. A rash is sometimes caused by drugs and by the toxic effects of infective illness. Dusting powder should be applied to the affected areas. Infantile dermatitis is seldom seen before the second month of life.

WOOL RASH

Woollen vests sometimes cause a rash which resembles urticaria. It is probably the effect of mechanical irritation on a sensitive skin. In these circumstances wool should not be worn next to the skin.

INTERTRIGO

Flexural dermatitis is apt to develop in young infants in whom the vernix caseosa has not been thoroughly cleansed from the flexures and who are improperly dried and powdered after bathing. The condition is uncommon. The axillæ are affected much more often than any other site, but the transverse folds at the sides of the neck in fat infants, the post-auricular folds and the groins may be affected. Decomposition following incomplete cleansing, and moisture following careless drying or arising from the accumulation of sweat which is not removed by absorption with dusting powder, favour the multiplication of mixed organisms of low virulence, such as the *Staphylococcus albus* and *Bacillus coli*. The skin becomes reddened, denuded of epidermis and oozes serum. The mixed infection produces a foul odour.

The treatment consists of thorough washing with soap and water once or twice a day, thorough drying, and painting with 1 per cent gentian violet in aqueous solution, followed after drying by the application of dusting powder. The condition clears up within two or three days.

CONGENITAL SYPHILIS

Syphilitic lesions of the skin are now infrequently seen in infants with congenital syphilis because the majority of syphilitic mothers receive treatment in pregnancy. Syphilitic skin eruptions do not usually appear until the latter part of the neonatal period. A maculopapular eruption is much the commonest type. These lesions are dark red and about the size of the infant's finger-nails. They are usually circular and only slightly elevated, and are most abundant on the back, the buttocks, and the posterior aspect of the thighs. The colour gradually fades through a dusky red to a coppery hue. The rash comes out slowly, requiring one to three weeks for its full development, and it fades gradually, leaving a discoloration which persists for a long time. Mild exfoliation of the palms and soles is frequently seen and is characteristic of the disease. Bullous lesions of the skin and fissuring at the muco-cutaneous junctions are occasional features in the new-born period, and mucous patches may also occur, but condylomas are seldom seen until later in infancy. The diagnosis is confirmed by the presence of other signs of congenital syphilis, notably snuffles and osteochondritis, and by evidence of maternal syphilis. Little reliance can be placed on the Wassermann and other serological tests in the first three months of life.

SCABIES

Infestation with the acarus is occasionally seen in the first month. It is invariably transmitted by the mother. This disease is often overlooked in the differential diagnosis of skin disorders in young infants, chiefly because of the unorthodox clinical picture presented by it at this age. In mild cases it may have a local distribution anywhere on the trunk or limbs but soon tends to become generalized; the head is seldom involved. The feet, including the soles, are usually affected because of their frequent contact with the mother's arms. The lesions often become vesicular in infants, and these frequently become secondarily infected, so that the septic condition may be the predominant feature. Differentiation from urticaria is often difficult, but the transience and intermittence of urticaria and the presence of tiny black burrows in scabies are helpful points. Scabies in the mother provides invaluable evidence and should always be carefully looked for in doubtful cases. There is usually no evidence of scratching in young infants.

Treatment—Sulphur ointment, 5 per cent, is still the most convenient method of treating young infants, and it is quite satisfactory. It must, however, be thorough. The ointment should be thoroughly rubbed in twice daily for three days, bathing being omitted during this time and restarted twelve hours after the last application. The clothing and bedding must be changed at the conclusion of the course of treatment. The simultaneous treatment of the mother and other affected members of the family, and sterilization of their clothing and bedding, is essential if reinfestation is to be avoided.

THE INDURATIONS

Traumatic induration—Subcutaneous induration produced by birth trauma is not uncommon. It is usually produced by the blades of forceps compressing the subcutaneous fat against underlying bone, such as the cheek bones or jaws, but may occasionally be found over soft tissues. The subcutaneous fat feels hard and is adherent to the overlying skin, which may also be injured. There is no inflammation and the lesions are not as a rule observed until several days after birth. They subside slowly, taking several weeks to disappear. No treatment is indicated.

Benign induration of the newborn—This uncommon condition has an uncertain etiology. It may appear after the first few days of life or in the next few weeks. Attention is often first drawn to it during bathing when a large patch of subcutaneous induration is felt. Large areas of the trunk, limbs, neck and face may become affected within a few days and the process may continue to extend for a week or two. There is usually a slight dusky-red discoloration of the skin in the affected zones during the stage of progression, but there is no inflammation or tenderness. The skin is adherent to the hard subcutaneous tissue, which feels like a cast when large areas are affected. There is no apparent constitutional disturbance and there are no indications for treatment. Resolution begins after a week or two but several more will elapse before it is complete, its inception indicated by the appearance of softening which breaks up the affected areas and at a later stage, imparts a coarse granular feeling to them.

Sclerema—This is a grave condition which arises in severe infections with profound dehydration, notably gastro-enteritis. There is a generalized hardening

of the subcutaneous fat and the skin looks dry but cannot be pinched up. The condition may subside in its earlier stages, if the progress of the underlying disease can be checked and the dehydration rapidly eliminated, but the process is irreversible in its more advanced stages and the inevitable fatal issue is not long delayed.

Injection induration—The subcutaneous injection of drugs in irritating vehicles often causes induration which may take weeks to disappear. Occasionally a sterile abscess is formed and this may either be absorbed or break down and form an open wound which will become infected. A large fluctuating swelling of this nature should be incised to promote rapid healing and to avoid the possibility of extensive sloughing of the skin with a slowly healing wound. Substances known to be irritating to the subcutaneous tissue should be injected intramuscularly, preferably into the gluteal or triceps muscles, as no harmful irritation is produced in this situation.

PHYSIOLOGICAL DESQUAMATION

Visible desquamation of the skin is common in the first few days of life. Occasionally, owing to an excessive amount of cornified epithelium, it attains excessive proportions, but the appearance of the skin becomes normal after a few days and no treatment is required.

ICHTHYOSIS

Ichthyosis, which is usually an hereditary disease, seldom develops until after the first year. The rare allied condition of congenital ichthyosis is a grave disease which rapidly proves fatal.

BIRTH-MARKS

These congenital, localized, overgrowths of skin elements are common and it is unfortunate that the face is the principal site.

Hæmangiomæ—There are three types—the port-wine stain, the raspberry or pearly naevus and the spider naevus.

The port-wine stain cannot be completely blanched by pressure like the other two types of hæmangioma, but the fact that it can be blanched to a considerable extent serves to differentiate it from discoloration produced by the extravasated blood in bruises which have been acquired at birth. Port-wine stains are not amenable to treatment, but small naevi of this type sometimes disappear in infancy.

Small raspberry naevi are still most conveniently treated with CO₂ snow, but larger ones should be treated by X-ray therapy. Spider naevi can be easily and successfully treated with the electric cautery. The treatment of either type is usually deferred for several months.

Lymphangiomas—These non-pigmented birth-marks are uncommon and usually do not require treatment for æsthetic reasons.

Moles are not always congenital. They are epithelial growths and are usually pigmented. Treatment is unnecessary, as a rule, but facial disfigurement and an increase in size are indications for removal. This is usually done after the lapse of several months, either by means of CO₂ snow or excision.

THE THERAPEUTIC USE OF PENICILLIN

By LAWRENCE P. GARROD, M.D., F.R.C.P.

Bacteriologist to St Bartholomew's Hospital, Professor of Bacteriology in the University of London

SELDOM, if ever, has any new remedy been in such demand for so long before it became obtainable as in the case of penicillin. The tantalizing position which now exists is the more serious because penicillin will not only shorten illness and preserve structure or function which may otherwise be lost, but may sometimes afford the only treatment likely to save life. This position will not be allowed to continue for long, at least after the end of the war, when military surgery will no longer make heavy demands on available supplies, and the profession as a whole should be prepared for the opportunity of using penicillin. It is by no means as simple to use as, for example, the sulphonamides, and it is unlikely ever to be so easily made. A sound understanding of its properties and the indications for its use are therefore necessary if deplorable waste and failure are to be avoided.

DISCOVERY

The story of the chance contamination of a culture of staphylococci in Fleming's laboratory (Fleming, 1929) is now well known. A single spore which floated into this agar plate is the sole ancestor of enormous masses of mould now growing under factory conditions for the production of penicillin. But between this first observation and the present day, discovery passed through two stages. Fleming observed that the colony of this mould, since identified as *Penicillium notatum*, antagonized the growth of staphylococci around it. The filtrate of a culture in broth strongly inhibited the growth of some bacteria, but others were unaffected by it, and Fleming (1932) consequently employed it in selective culture media. He visualized from the first the possibility that penicillin might be a valuable antiseptic, but the preparations then available were weak and too unstable for this type of use. The work of Chain and Florey, begun at Oxford in 1938, resulted in the extraction of penicillin from culture filtrates in a far more potent and relatively stable form (Chain *et al*, 1940, Abraham *et al*, 1941). *In vitro* and experimental study of its properties showed that even in the form then available—now known to have been grossly impure—it was a potential therapeutic agent with unexampled qualities. The early clinical trials which followed fully justified expectation. The work of Florey and his colleagues has established the position of penicillin in therapeutics, on the laboratory side they have achieved further stages in its purification (Abraham and Chain, 1942), and in the clinical field they have defined a large part of the main sphere of its usefulness, as well as the methods of administration by which its effects can be obtained (Florey and Florey, 1943). In so far as the expansion of clinical study to embrace other diseases and conditions is now proceeding largely in the U.S.A., this is because the greater manufacturing resources of that country have alone been able to furnish the necessary quantities of material.

PROPERTIES OF PENICILLIN

As now obtained by a process of extraction from fluid cultures of *P. notatum*, penicillin is an unstable organic acid, and its calcium and sodium salts are used in

therapeutics The former has so far been used only for local application the latter can be administered by any route, but has the disadvantage of being hygroscopic Either is reasonably stable if kept dry and in the cold Unless in tablet form, either salt of penicillin is a yellow powder freely soluble in water As now prepared it is far from pure indeed batches found clinically quite effective have contained as little as 1 per cent of true penicillin, although the present output usually contains 10 per cent. or more The measure of penicillin is therefore not by weight but by the Florey or Oxford unit, which is assessed by estimating capacity to inhibit bacterial growth in comparison with a standard sample Although the solid is stable, solutions are not, and should therefore be freshly prepared. Penicillin is destroyed by heat, acids and alkalis, heavy metals, alcohol, and by an enzyme produced by certain resistant bacteria It needs therefore to be protected carefully from contamination as well as from various chemical insults, and the preparation of solutions and such like should be in the hands of those with bacteriological knowledge and experience

It has often been said that the ideal antiseptic should have the highest possible toxicity for pathogenic bacteria, should be harmless to the tissues of the body, and be capable of acting in any medium. These are precisely the qualities of penicillin, and they afford a complete explanation of what it will do Even in extreme dilution—one part in many millions of a good sample—penicillin will completely prevent the growth of susceptible bacteria Nevertheless, concentrations far greater than this are without effect on the activity of leucocytes or of any other living cells which have been tested *in vitro*, whilst harmlessness to other tissues and to the body as a whole, originally proved by animal experiment, is now attested by the absence of untoward effects following systemic treatment in many human beings The third essential property, originally demonstrated by the Oxford workers, is the constant behaviour of penicillin in different media So many antiseptics otherwise calculated to have a useful effect are inactivated by proteins and other constituents of body fluids Penicillin is apparently indifferent to such influences it acts as well in serum, blood, or even pus, as in broth or water

SUSCEPTIBLE AND RESISTANT BACTERIA

It is impossible to emphasize too strongly that a prerequisite of penicillin treatment is a bacteriological diagnosis Many bacteria are so resistant to penicillin that it can have no influence whatsoever on the infections caused by them A rough though not infallible guide to their sensitivity is the gram staining reaction It may be mentioned here that other antibacterial substances obtained from many of hundreds of other species of mould studied recently fall into two classes One class acts more or less uniformly on all bacteria, whether gram-positive or gram-negative patulin (now shown to be identical with claviformin) is an example, and it may be added that these substances are much more toxic to mammalian tissues than is penicillin The second class has little action on most gram-negative species, acting almost exclusively on gram-positive penicillin belongs to this class, but it must be understood that no other member of it has so far been found to possess all the other qualities to which penicillin owes its value

The most important fully susceptible organisms are the three main species of pyogenic cocci, *Staphylococcus aureus*, *Streptococcus pyogenes* and the pneumococcus The range of infections brought within the possible scope of penicillin

treatment by these alone is wide. Other susceptible gram-positive species are the gas-gangrene group, *C diphtheriae*, *B anthracis*, *Streptococcus viridans* and the *Actinomyces*—most of these are rather less susceptible than the pyogenic cocci, and individual strains, particularly of the two last named, vary in their behaviour. The gram-negative exceptions, distinguished by a high degree of susceptibility, are the gonococcus and meningococcus. The typhoid-dysentery group is so comparatively resistant that treatment cannot be contemplated until highly potent penicillin is freely available. Other gram-negative bacilli are so much more resistant still that treatment is out of the question—these include the genera *Brucella* and *Hæmophilus*, and—an important fact in wound treatment—the proteus genus, *Ps pyocyanea* and various coliform bacilli. The tubercle bacillus is completely resistant, and there is no evidence of any action on filtrable viruses. *Streptococcus faecalis* is an exception in being resistant although gram-positive. It is useful to know not only the species of organism responsible for an infection, but the degree of sensitivity of the individual strain to penicillin—this can be determined by a simple cultural test. Penicillin-resistant strains are not nearly so common as sulphonamide-resistant, but they do occur occasionally, at least among staphylococci, and variability in behaviour in *Strep viridans* and the *Actinomyces* has already been mentioned.

METHODS OF TREATMENT

The foregoing are the facts about penicillin—how can they be translated into therapeutics? There are, in the first place, two distinct forms of penicillin treatment, local and systemic.

In local treatment, penicillin is applied to the infected area in the form of a solution, cream, or powder, in order to obtain a direct effect on the micro-organism *in situ*. If this is impracticable because the lesion is inaccessible or too deep-seated and extensive, then the approach can only be by way of the circulation, and systemic treatment is required. Penicillin cannot be given by the mouth, since acid in the stomach destroys it—intramuscular or intravenous injection is necessary. Owing to the rapidity with which penicillin is eliminated by the kidney, heavy and sustained dosage is required to maintain an adequate concentration in the blood. This form of treatment is therefore immensely wasteful, although necessarily so, unless, as was sometimes done in Oxford in the early days, the drug is extracted from the urine and re-administered. A full course of systemic treatment for a severe infection will use a million units or more. Local treatment can often be carried through successfully with a few thousand. It is thus clear that local treatment should be used whenever possible, and during the present scarcity progress can most usefully be made by devising better methods of local application.

SYSTEMIC TREATMENT—The daily systemic dose usually given to an adult for a severe infection is about 120,000 units, and is often given by continuous intravenous drip in glucose saline. Experience in my hospital has shown that an intramuscular drip is also feasible. If single intramuscular injections are given they must be repeated at intervals of three hours, day and night. Administration may have to be continued for as long as seven to ten days. It is advisable to estimate the penicillin content of the blood from time to time in order to verify that an adequate dose is being given.

One of the clearest indications for this treatment is dangerous infection by *Staphylococcus aureus*. Although sulphathiazole has somewhat improved the

outlook in such conditions it cannot be said to control them regularly, and a more reliable form of chemotherapy is badly needed. This penicillin provides. Staphylococcal septicaemia calls for it unequivocally when the drug is available. Other indications are cavernous sinus thrombosis, acute osteomyelitis, extensive carbuncle and staphylococcal broncho-pneumonia (Bennett and Parkes, 1944).

Hemolytic streptococcal and *pneumococcal* infections should at present be treated with penicillin only if they prove to be sulphonamide-resistant. Here again septicaemia is the chief indication. meningitis has also been treated by combined systemic and intrathecal injections—sometimes by the latter alone. According to an American report (Statement, 1943) pneumococcal pneumonia may respond to a total dose of only 200,000 units.

Another large field of usefulness is to be found in various forms of *wound sepsis*. It is noteworthy that all the gram-positive bacteria which cause wound infections—and these are the most dangerous—are susceptible to penicillin. Much wound sepsis can be treated locally—indeed it may be prevented altogether by the prophylactic application of penicillin—but there are two wound conditions calling for systemic treatment. One is the early *infected compound fracture*, which, as the work of Cairns and Florey in Tunisia (Report, 1943) has shown, can be closed and thus converted into a simple fracture with the aid of a five- to seven-day course of penicillin. The other is *gas-gangrene*. Information about the effect of penicillin in this infection is scanty, but encouraging. It should be remembered that penicillin neither penetrates dead tissue nor neutralizes toxin, it thus by no means removes the need for surgical and serum treatment. The principle that penicillin cannot replace necessary surgical treatment is indeed of universal application.

Another, although totally different, condition in which systemic penicillin treatment is effective is *gonorrhoea*. It appears to be fully established that any uncomplicated case of this disease, whether sulphonamide-resistant or not and whether early or late, can be cured by a few intramuscular injections occupying not more than twenty-four hours and using not more than 100,000 units. From a recent publication in the U.S.A. (Mahoney *et al.*, 1943) it also seems likely that *syphilis* will prove curable, at least in the early stages, although a larger total dose is necessary. There is therefore a prospect that both forms of venereal disease may be cured more simply and certainly than before by a single form of treatment, and the care of patients with this disease may then cease to be a speciality.

There is as yet little information about the treatment of *actinomycosis*, and none about anthrax. A discouraging qualification to all that has been said hitherto is that penicillin usually fails in the presence of a *bacterial endocarditis*. This applies not only to endocarditis complicating septicaemia due to one of the pyogenic cocci, but to the subacute form commonly due to *Strept. viridans*. Only temporary benefit accrues in this condition, even by prolonged treatment with enormous total dosage.

LOCAL APPLICATION—As an antiseptic applied locally penicillin has many known uses, and others will doubtless be found when further fields have been explored and better methods of application devised. Whereas the process of systemic administration is standardized and can almost be governed by rule of thumb, efficient local application calls for methods varying not only in different conditions but from case to case, and may call for ingenuity and resource. The difficulty is to maintain adequate contact with the whole of the infected area until sterilization has been achieved. Penicillin is in a true sense an antiseptic rat

than a germicide it does not kill bacteria quickly, and its intermittent presence useless its action must be continuous for many hours and usually for several days.

It is as a weapon against *wound sepsis* that penicillin is chiefly being used present. In the first place it can be used prophylactically. McIntosh and Sel (1942) found experimentally that it excels the sulphonamides and proflavine preventing gas-gangrene, and the dusting of wounds in Sicily with a powder consisting of penicillin diluted with sulphanilamide reduced the incidence of pyogenic infection on arrival at the forward base in North Africa. For what is known the later treatment of battle wounds the profession is also indebted almost entirely to the work of Florey and Cairns and their surgical collaborators in that during the early summer of 1943. They found first that the local treatment of chronic sepsis was ineffective, and the systemic too expensive in penicillin. It was necessary to begin treatment within fourteen days of wounding, and their method for soft tissue wounds, however extensive and regardless of infection, was to suture them completely whenever possible, and instil penicillin solution twice daily through narrow rubber tubes left in the wound and passing out through either the suture line or a stab incision alongside it. Gram-positive infection was eliminated and rapid healing was the usual result. Much of the penicillin now being produced in this country is being used for this and similar purposes, and no one is likely to contend that it could be better employed.

It is not only to battle wounds that this kind of treatment is applicable. In an *operation wound* for the drainage of a focus of infection can be similarly treated but the operation may have to be modified with the object of creating a space in which penicillin solution can be retained. The wound must in fact be sutured and a tube inserted at its highest point. Florey and Florey (1943) report good results after mastoidectomies terminated in this way, and Mowlem (1944) has modified his operation for osteomyelitis of the mandible with the same purpose and excellent effects. Penicillin may also be introduced into sinuses and various foci of chronic sepsis. This is a somewhat disappointing field, and failure may apparently be due to any of several causes. The solution may not penetrate at all to the remoter parts of the lesion, or may not be well retained, and surrounding fibrosis may mechanically prevent closure. The worst results have been in chronic osteomyelitis: penicillin is no substitute for adequate surgery in this condition (Robertson, 1944).

A far more promising field is the treatment of *infections of the hand*, recently reported on by Florey and Williams (1944). Penicillin is of particular value in tendon sheath infections, and in this and other forms of sepsis involving the hand function can be preserved and restored with much more certainty and rapidly than by other methods. Penicillin is also valuable in the treatment of *burns*, both for preventing the development of infection at an early stage and for eradicating it at a later stage in order to prepare the area for grafting. A powder containing calcium penicillin diluted with sulphanilamide may be applied with an insufflator or the vehicle may be a cream with a lanette wax base which is smeared over the dressing before application. This form of treatment has been described fully by Clark *et al* (1943) and Bodenham (1943).

Another form of treatment with several uses is injection of penicillin solution into a cavity after aspiration of its contents. *Abscesses* may sometimes be treated conservatively by this means: the contents can be sterilized and resolution may

follow *Pleural empyema* is a special example of this, and the same is true of it, but it appears that surgical treatment may also be required to secure a good functional result. A third example is the treatment of *meningitis*, which calls for intrathecal injection, since penicillin does not pass like the sulphonamides from the blood into the cerebrospinal fluid. Fleming (1943) recorded the first case so treated, and the efficacy of this treatment in overcoming sulphonamide-resistant streptococcal or pneumococcal meningitis has since been confirmed in others.

Some diseases of the skin are amenable to treatment with penicillin cream. In impetigo and blepharitis the effect is uniformly rapid, and long-standing cases of sycosis barbæ have sometimes cleared up completely. This condition may recur, and although a further short course has been as effective as the first, the ultimate prognosis is still in doubt (Roxburgh *et al*, 1944). Penicillin also has uses in ophthalmology. It will not only cure conjunctivitis due to susceptible bacteria, but, since it penetrates the cornea, has been used successfully in infections of the anterior chamber and even in some cases of iritis.

THE PRESENT AND THE FUTURE

Penicillin is at present only available in this country to the medical departments of the fighting Services and in a few civilian research centres. How long it will be before supplies can be released for general use is likely to depend, in the first place, on the course of the war. The aim of the foregoing account is to give a general picture of the new therapeutic resources which must ultimately be placed in the hands of the profession generally. It will perhaps be appreciated that a thorough understanding of this remarkable substance is necessary for its successful use: there is indeed a danger of its being wasted on conditions in which it can be of no benefit. The proper conduct of a major case also demands laboratory and other facilities which are only readily available in well-equipped hospitals. The present scarcity of penicillin is therefore not the only obstacle to such a universal therapeutic revolution as the sulphonamides produced in 1936-8.

References

- Abraham, E. P., and Chain, E. (1942) *Brit J exper Path*, **23**, 103
 — *et al* (1941) *Lancet*, **2**, 177
 Bennett, T., and Parkes, T. (1944) *Ibid*, **1**, 305
 Bodenham, D. C. (1943) *Ibid*, **2**, 725
 Chain, E., *et al* (1940) *Ibid*, **2**, 226
 Clark, A. M., *et al* (1943) *Ibid*, **1**, 605
 Fleming, A. (1929) *Brit J exper Path*, **10**, 226
 — (1932) *J Path Bact*, **35**, 831
 — (1943) *Lancet*, **2**, 434.
 Florey, M. E., and Florey, H. W. (1943) *Ibid*, **1**, 387.
 — and Williams, R. E. O. (1944) *Ibid*, **1**, 73
 McIntosh, J., and Selbie, F. R. (1942) *Ibid*, **2**, 750
 Mahoney, J. F., Arnold, R. C., and Harris, A. D. (1943) *Amer J pub Hlth*, **33**, 1387
 Mowlem, R. (1944) *Brit med J*, **1**, 517
 Report (1943) Report to the War Office and the Medical Research Council concerning the Use of Penicillin in War Wounds, War Office (A.M.D. 7), 1943 (For summaries see *Lancet*, 1943, **2**, 742, and *Brit med J*, 1943, **2**, 755)
 Robertson, I. M. (1944) *Brit med J*, **1**, 519
 Roxburgh, I. A., Christie, R. V., and Roxburgh, A. C. (1944) *Ibid*, **1**, 524.
 Statement (1943) *J Amer med Ass*, **122**, 1217.

(A full list of publications on penicillin with abstracts of many, is given in the January 1944 number of the *British Medical Bulletin*. The Medical Research Council War Memorandum No. 12, 'The Use of Penicillin in Treating War Wounds', gives technical details omitted from this paper including methods for preparing solutions, powders and creams.)

HEREDITY OF BLOOD GROUPS

By R M WALKER, M D, D P H

Medical Officer of Health, Burgh of Maybole, Ayrshire

CLASSIFICATION

THERE are three methods of classifying the four groups of human blood. In two of these, the Janski and Moss, Roman numerals are used, and differ slightly, I and IV being transposed. The international classification, A, B, AB and O is preferable, and indeed essential in dealing with problems of heredity, as letters are generally employed to express certain characters, and combinations of these can be simply and graphically shown.

The two components of blood used in blood grouping are the red cells (agglutinogens) and the serum or plasma (agglutinins). It is usual to employ the cells as the basis of classification and, using known agglutinating sera, the cells can readily be identified as belonging to groups O, A, B, or AB. The process can of course be reversed, and both methods should be used in transfusion as an extra safeguard against possible incompatibilities. In medico-legal cases it is essential to use both methods to check the results.

Using capital letters to denote the properties of the red cells, agglutinogens, and small Greek letters for the agglutinins, the constitution of all four bloods can be shown in a simple manner. Thus group O will be represented by $O\alpha\beta$, both agglutinins being present in the serum of O, A by $A\beta$, B by $B\alpha$, and AB by AB —, no agglutinins being present. If agglutination is expressed by + and its absence by —, a table can be constructed showing all the phenomena, placing the cells at the head of four columns, and the sera at one side, thus —

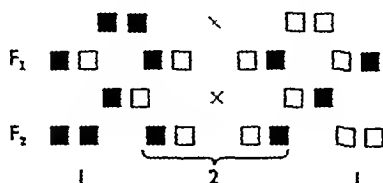
	(Red cells)			
	$O\alpha\beta$	$A\beta$	$B\alpha$	AB
(Sera) $O\alpha\beta$	—	+	+	+
$A\beta$	—	—	+	—
$B\alpha$	—	+	—	+
AB	—	—	—	—

From this table it is evident that O is a universal donor, and AB a universal recipient.

LAWS OF HEREDITY

From numerous observations on blood groups in families, it soon became evident that the characters of the groups are inherited according to the laws of Mendelism. It is difficult to give a short definition of Mendelism but it is easily demonstrated by examples. For simplification an obvious character can be taken, say colour. In certain animals, if a pure white is mated with a pure black, the offspring will be grey or intermediate in colour. This is called the first filial (F_1) generation. If now these F_1 animals are interbred, the second generation (F_2) will be of three types, white, grey, black, and in the proportion 1 : 2 : 1. This phenomenon is known as segregation and always occurs in the same numerical proportion. Thus, though the character (colour) blended in F_1 , the factors producing it did not,

but separated in F_2 . The factors are known as genes and as they act in pairs, one derived from each parent, they are called allelomorphs. The grey animals differ from the white or the black, as they have one factor for each colour derived from each parent, whereas the white or black have two similar factors for the one colour, one from each parent. In the former case the animals are heterozygous, in the latter homozygous. The following diagram should make this clear—



There is one homozygote black, one homozygote white and two heterozygotes grey. That is the straightforward type, but another result appears in some cases, an apparent contradiction, viz dominance. If a brown rabbit is mated to an albino, all the F_1 progeny are brown. If the F_1 generation is interbred, the F_2 progeny will be three browns to one albino, i.e., a 3 : 1 ratio instead of the normal 1 : 2 : 1, but two of these browns will be heterozygous and one brown, pure or homozygous, and thus can be proved by further crossing. Here dominance has masked the true genetic constitution, but the albino factor or gene is still present although recessive. This difference is of paramount importance in blood group heredity.

So far these are merely concepts to account for the known facts. Is there any anatomical basis for these views? Genes cannot as yet be isolated, but modern cytology gives the answer as to what carries the genes—the chromosomes of the cell nucleus. The chromatin of the nucleus of a cell about to divide changes from a long thread or threads (spireme) to rod- or oval-shaped masses called chromosomes. These are invariably associated in pairs, similar in size, shape and even in histological detail. They are homologous chromosomes, one derived from each parent, and on them are borne the allelomorphs in linear order.

In man there are twenty-four pairs of chromosomes in each cell. Growth by multiplication of the cells (mitosis) begins in the nucleus with accurate halving of all the homologous chromosomes, so that the number of chromosomes remains constant. In the sexual cells (gametes) there is a reduction or meiosis. At one stage in the maturation of the gametes whole chromosomes are passed to the two new daughter cells, one homologous chromosome to each, so that the ripe gamete has only half the number. This cell is haploid in chromosome content. When fertilization occurs it is an additive process and the diploid or normal condition is restored in the zygote, and ordinary mitosis then goes on as before. The allelomorphs are segregated as the gametes are formed and new combinations of genes will occur when the zygote is formed.

BLOOD GROUPS A, O, B—Applying these facts to blood groups it will be found that in the four groups, genes control their heredity and that they are multiple allelomorphs, i.e., they are different phases at the same locus in a chromosome and only two can exist at the same time, one on each chromosome. Of the

four groups, A and B are dominant and O is recessive AB is a combination of two dominants The four groups are really six, as A and B may be homo- or heterozygous, i.e., AA, AO, BB, BO, though this is not "exteriorized," but it may be possible to distinguish them if the blood group of the children is ascertained AB is always heterozygous and O always homozygous (OO) It is therefore possible knowing the groups of father and mother to tell the group or groups of the children There are four axioms that are self-evident —

- (1) A child cannot have in its blood a group which is not in one or other of its parents
- (2) A child may not have in its blood a group even if it is in one or both parents
- (3) A parent AB cannot have a child O
- (4) A parent O cannot have a child AB

It is easy to construct a table showing all the possibilities of the matings of different groups—

Parents			Children	
A	×	A	A, O	
A	×	B	A, B, AB, O	
A	×	O	A, O	
B	×	O	B, O	
B	×	B	B, O	
AB	×	A	A, B, AB	
AB	×	B	A, B, AB	
AB	×	O	A, B	
AB	×	AB	A, B, AB	
O	×	O	O	

There are always four possible types of children, but as it is not known whether A or B are homo- or heterozygous, AA and AO will not differentiate serologically that is both are similar phenotypes but different genotypes

Sub-groups —Group A exhibits differences within itself There are at least two sub-groups, A_1 and A_2 , the latter showing weaker agglutination against the homologous agglutinin (β or anti-A) This is shown by absorption methods the serum β will still agglutinate A_1 cells after being acted upon by A_2 cells, and the reaction is to some extent quantitative This is of considerable importance in transfusion as individuals of A_2 sub-group (A_2, A_2B) may be erroneously classed as O or B It does not invalidate the Mendelian inheritance of blood groups, but affords additional proof as the A_2 group acts recessively to A_1 Thus there is an increased number of blood groups, and a further step towards identifying individual blood A, formerly could be AA or AO it can now be divided into A_1A, A_1A_2, A_1O, A_2O Three of these will read as A_1 and one as A_2 (O being recessive) The AB group will be similarly split up into A_1B and A_2B , and a table can be constructed, more elaborate than the first, showing all the possible children of the various matings A third sub-group A_3 has been described weaker than A_2 and there may possibly be a scale down to O, thus —

$$A_1 > A_2 > A_3 \qquad \qquad \qquad > O$$

This is in accord with the action of multiple allelomorphs in the colour of flowers when red dominates pale red, pale red rose, rose pale rose, and pale rose white

BLOOD GROUPS M AND N

Quite independent of the ABO groups are the blood properties M and N, discovered by Landsteiner. M and N are agglutinogens in the erythrocytes of man, and one or both are present in all individuals. There are no natural iso-agglutinins present in human serum, hence the MN groups can be ignored in blood transfusion. An agglutinin can be produced by inoculating rabbits with the appropriate corpuscles and by means of absorption the species agglutinins are removed, leaving a serum of high titre against M or N. The heredity of M and N is controlled by a single pair of allelomorphs and, as neither is recessive, the genetic formulæ are MM, NN, and MN.

A similar table to the ABO possibilities can be constructed —

<i>Parents</i>	<i>Children</i>
MM × MM	M
NN × NN	N
MM × NN	MN
MN × MN	M, N, MN
MN × MM	M, MN
MN × NN	N, MN

With the assistance of MN properties, the four blood groups can now be extended to twelve —

A M	B M	O M	AB M
A N	B N	O N	AB N
A MN	B MN	O MN	AB MN

From any matings of these it is possible to tell the groups to which the children must belong.

THE Rh FACTOR

The Rh agglutinin originally discovered by Landsteiner in Rhesus monkeys is present in the erythrocytes of the majority of human individuals but absent in about 15 per cent. It thus permits the distinction of two new blood groups in man, Rh-positive, and Rh-negative. These are quite distinct from the ABO and MN groups. Unlike the MN groups they cannot be ignored in blood transfusion because it was found that serious ill-effects could occur following the transfusion of Rh-positive blood to Rh-negative patients. It was reasonably concluded that some of the untoward results in ABO groups, even when correctly matched—prior to the discovery of the Rh component—were due to this incompatibility. In Rh-negative patients the use of Rh-positive blood would lead to the production of antibodies to the erythrocytes, and in a second transfusion to such a degree as to produce extensive hæmolytic of the introduced blood. On the same line of reasoning the discovery of these two new groups offered a reasonable explanation of the causation of hæmolytic disease of the newborn (erythroblastosis foetalis). In most of the cases (not all) recently investigated the foetus was found to be Rh-positive and the mother Rh-negative. The mother had developed an iso-agglutinin against the Rh factor, and in some way this had penetrated the placenta and affected the blood cells of the foetus. The possibility of this result was not quite unforeseen. In the ABO group it was recognized that the presence of a healthy child in the uterus of a mother of different and incompatible blood type was difficult to explain considering the known antagonism of members of the

ABO group Hirszfeld investigated this anomaly of "serological symbiosis" and pointed out that the circulations of mother and fœtus represented two different worlds communicating by fine membranes but only permeable with difficulty by antigens and antibodies. The Rh factor seems to prove that the symbiosis is not always harmonious and in cases of hæmolytic disease not due to the Rh factor; possibly ABO incompatibilities of mother and fœtus may be the cause.

The heredity of the Rh factor is fairly straightforward. Numerous observations on the groups make it clear that it is inherited as a simple Mendelian dominant. It is controlled by a single pair of allelomorphic genes and is an example of the presence and absence hypothesis. The two phenotypes (Rh-positive and Rh-negative) are the outward manifestation of the three possible genotypes. Following precedent using capital letters for present and small letters for absent characters, we have, Rh Rh, Rh rh and rh rh. The first and third are homozygous, the second heterozygous. As the character is dominant the first two will be Rh-positive, the third Rh-negative. Obviously if the father is homozygous Rh Rh and the mother homozygous rh rh all the children will have one Rh gene derived from the father, and all will be Rh-positive serologically. If the father is heterozygous Rh rh there is an even chance that the children may be positive or negative. In all the positive children there will be a risk of hæmolytic disease because the rh mother may be isoimmunized by the presence of her own fœtus.

MEDICO-LEGAL SIGNIFICANCE

The heredity of blood groups is of considerable importance in forensic medicine. In *cases of disputed parentage* it is possible in some to disprove paternity. This was the object of the Bastardy Bill introduced in Parliament before the war. It is, however, impossible to prove that a man is the father, but the converse is true, in a proportion of cases, dependent on the distribution of the various blood groups. Obviously if a large proportion of the population belongs to the same group, the chances of disproving paternity are slight. With the ABO group alone the probability is about one in seven, but with the additional information afforded by MN groups, it is now about one in three.

The tests may also be employed in disproving maternity, though this is much less frequently required. They are also of service in distinguishing children who have been accidentally confused, e.g., in a children's ward or crèche.

A further use is for *blood stains*. It may be possible to detect agglutinin in an extract of stain but a negative result is of little value. Agglutinogens cannot be determined directly, but by absorption methods it may be possible to identify the group. The method is of limited value.

As many persons are secretors of agglutinogens it is possible to determine the group in specimens of *saliva* and *semen* especially, and more doubtfully in tissues and body fluids.

Bibliography

- Boorman, K. E., Dodd, B. E. and Mollison, P. L. (1942) *Brit med J*, 2, 535
 Darlington, C. D. (1942) "Recent Advances in Cytology," London
 Ford, E. B. (1938) "The Study of Heredity," London
 Harley, D. (1943) "Medico-Legal Blood Group Determination," London
 Hirszfeld, L. (1938) "Les Groupes Sanguins," Paris

THE PRACTITIONER

THE TREATMENT OF INFECTIONS OF THE HAND: THE NECESSITY FOR A NEW APPROACH

By DAVID PATEY, MS, FRCS

Surgeon in charge of Out-Patients and Lecturer in Operative Surgery and Surgical Pathology, Middlesex Hospital

THE treatment of infections of the hand, after passing through a phase of neglect, is now established as a skilled form of surgical treatment worthy of the attention of surgeons of experience. Technical procedures have been fully ventilated in the surgical literature of the last twenty years or so, and classical monographs, notably those of Kanavel and Iselin, have exercised a world-wide influence. The results of treatment have shown considerable improvement from the increased interest in and study of these cases. Nevertheless, in all too many cases the results of serious infections of the hand are still disastrous, even though the standard of surgical treatment has been of the highest. It seems that the time is now ripe for a further change in approach in the treatment of these cases, the emphasis being shifted from the details of treatment of the established infection to the first-aid and prophylactic aspects. A brief report of four recent cases will illustrate the point, by the contrast between the first two cases and the last two.

Case 1. This was a middle-aged woman who in August 1943 accidentally ran a needle into the base of the ring finger of the right hand. Shortly afterwards the finger and hand became painful and tender but she did not report for treatment until five days later, when the pain was severe and moderate swelling and marked tenderness were present about the proximal phalanx and adjacent parts of the hand. Sulphathiazole treatment was started and the hand put at rest. Three days later, under general anaesthesia and using a tourniquet, commissural incisions were made on either side of the infected finger and a small amount of pus evacuated containing *Staphylococcus aureus*. But in spite of the onset of the infection and a further drainage operation, purulent arthritis of the proximal interphalangeal joint developed. A course of general and local penicillin one month after the onset of the infection helped to diminish and localize the infection and accelerated healing. The sloughed flexor tendon slowly separated, as also did a large sequestrum from the proximal phalanx, and it was five months before final healing took place. The patient refused amputation of the finger, which was left in a deformed, fixed, flexed position. The stiffness of the remaining fingers is slowly recovering, but lately she has developed a metastatic abscess of the spine.

Case 2. A middle-aged man, by occupation a seedsman, was constantly scratching and puncturing his hands at his work and took no notice of it. On the evening of December 1, 1943, he noticed that the middle finger of the left hand was painful. The next day it was much worse and in the evening he consulted his family practitioner. He was ordered hotomentations, but as the condition progressed was referred to hospital. On December 7, a subcutaneous collection of pus over the flexor aspect of the middle phalanx was incised, and sulphathiazole started, 30 gm in all being given. On December 10, there was clear evidence of purulent infection of the flexor tendon sheath of the affected finger, which was opened and drained by Iselin's incisions under general anaesthesia and using a tourniquet. Sloughing of the tendon occurred, and at the present time healing is slowly taking place. As in the first case, this patient will be left with a fixed flexion of the affected finger, but the function of the rest of the hand should eventually be restored.

Case 3. This is a personal experience. Recently, at 2 o'clock one Sunday afternoon, I pricked the pulp of the right thumb while pruning a rose. I paid no attention at first, but at teatime it was painful, and the pressure of a cup or knife caused well-marked tenderness. By 6 o'clock this was much worse, and I took 1 gm. of sulphathiazole and repeated the dose.

at 8 o'clock and at 10 o'clock the same night. By the time I went to bed the pain was much better, and was quite gone by the next morning.

Case 4. A medical colleague came to see me early one morning very worried about swelling and tenderness of the pulp of the right thumb which he had first noticed the previous evening, and which it was presumed was due to an unnoticed skin puncture. Sulphathiazole was started at once in 1 gm doses until 6 gm had been taken. The swelling subsided, but one small tender spot remained at which three days later a yellow subcuticular pin-head collection of pus could be seen. This was evacuated by pricking with a needle, and the finger returned to normal. *Staphylococcus aureus* was grown from the minute quantity of pus evacuated.

DISCUSSION

In all four cases the initial injury was similar, an apparently insignificant punctured wound. But the first two cases, although treated with all the facilities of modern medicine, were not treated chemotherapeutically until the infection had become established. Whereas the third case was treated in the early hours after the injury before the infection had become established, and the fourth case only a few hours later. Whilst it can be argued that in the last two cases severe infection might not have developed in any event, it seems abundantly clear that once an infection has become established in such structures as, for example, a tendon sheath, a joint, or a phalanx, restitution to normal is practically unattainable, and the surgical problem becomes one of making the best of a bad job. The only real hope for the betterment of results would appear to be the application of modern chemotherapy in the prophylactic stage.

Until penicillin becomes available in quantity, the sulphonamides must be the main standby. But the difficulty arises that, in view of the potential dangers of these drugs, the rule has been made that they can only be used under medical supervision, and the majority of individuals will not bother to seek medical advice for an insignificant cut, abrasion or puncture. As a result, there is little use of sulphonamides in this type of injury.

The first point at issue is whether or not there are any safe ways of making sulphonamides available as a household remedy. Although the arguments in favour of medical control of the systemic use of sulphonamides are strong, it is doubtful if the same applies to local application, and the installation of a sulphonamide pepper-pot in every household and factory medicine chest would be a valuable weapon against sepsis, and its routine use in cuts and abrasions of the hand would probably appreciably reduce the incidence of serious infections.

But the problem of the small punctured wound inaccessible to external applications would still remain. For these cases it would be necessary to educate the public at large (as the surgeon or pathologist who pricks himself operating on a septic case has been) to the knowledge that apparently insignificant pricks of the fingers and hands may be followed by most serious sepsis, that the early signs of such developing sepsis are either pain, tenderness or throbbing and that if after a prick any of these signs develop, seeking medical advice immediately, with the view to a course of chemotherapy before the infection has become established, may make the difference between the complete prevention of serious trouble and a prolonged illness leaving a permanently crippled hand. The new approach thus called for in infections of the hand is their conversion from surgical to chemotherapeutic emergencies.

THE INTERPRETATION OF PHYSICAL SIGNS

V—IN OTOLARYNGOLOGY

By F C ORMEROD, M.D., F.R.C.S

Surgeon, Royal National Throat, Nose and Ear Hospital, Surgeon in charge of Ear and Throat Department, Westminster Hospital, Surgeon in charge of Throat Department, Hospital for Consumption and Diseases of the Chest, Brompton

THE symptoms related by the patient and the signs observed by the examiner in the upper respiratory and auditory systems are definite and easily recognizable, but their analysis and interpretation are not always obvious. It is not difficult to observe and recognize changes in the appearance and function of these systems, but the wrong construction is easily and frequently put on these phenomena, as widely different pathological conditions may present signs which are nearly identical. A wrong interpretation of signs may lead to measures being undertaken which may cause irreversible functional changes, or extension of disease to hitherto normal structures. The object of this article is to enumerate the more usual changes in appearance and function and to attempt to indicate what they mean.

THE NOSE

THE SEPTUM—One of the most common symptoms in disease of the nose is obstruction to breathing and, apart from the swelling and congestion due to catarrh, a *deviation of the septum* is the most frequent cause. This can usually be easily recognized on looking into the nares—the central partition being seen lying over to one side and narrowing the nasal passage. The opposite side will appear wider, although there may be a compensatory hypertrophy of the middle or inferior turbinal. It should be remembered that the deviation of the septum is often S-shaped and there may be severe obstruction far back on what appears to be the wide side. The outer part of the nose is often displaced to the side opposite to the anterior deviation. If there is any doubt as to the nature of the structure blocking the nares, examination of it with a probe will, by its hardness and the thinness of the mucosa covering it, establish its nature.

A *spur of the septum* has these characters and can be distinguished from a turbinal or a polypus in that a probe will run between it and the lateral wall but not between it and the septum. The hypertrophied turbinal, however large and however thick the mucosa covering it, will always have a skeleton of bone which can be felt with a probe. Sometimes the mucosa of the turbinal is œdematous and resembles a polypus in appearance, but the bony skeleton can always be identified with the probe, which can be passed between it and the septum.

The most common mistake in diagnosis in the nose is the identification of turbinals or spurs of the septum as *polypi*. A polypus is a greyish lustrous translucent mass which usually appears from under the middle turbinal, can be moved about in all directions by a probe and has no bony skeleton.

Unilateral obstruction of the nose may be due to the presence of a *foreign body*, especially in children, and the presence of such is often indicated by a unilateral nasal discharge, possibly with some excoriation of the nares. A foreign body may

be identified with a probe, or in many cases by X-ray examination, but it must be remembered that nasal diphtheria also gives rise to unilateral obstruction, discharge and excoriation of the nares

Obstruction is sometimes complained of in cases of *atrophic rhinitis*—when the nasal passages are abnormally wide—but the width of the passage and the presence of crusting will establish the diagnosis

THE SINUSES—Pain is not a marked feature in the interior of the nose but is usually referred to the distribution of the first or second divisions of the V cranial nerve and must be contrasted with pain caused by disease of the para-nasal sinuses. Pain over the *frontal sinus* region may be due to infection of that sinus, when it shows a consistent periodicity, beginning about 8 or 9 o'clock in the morning, reaching a peak of intensity about noon and passing off about 3 or 4 o'clock in the afternoon. It may also be due to contact between a middle turbinal and the septum, where branches of the V cranial nerve are compressed and reflex pain is experienced either over the frontal sinus or less often in the infra-orbital region. This pain comes on in attacks but without the regular periodicity of the sinus pain. The two types can be differentiated by the presence or absence of signs of infection of the sinuses and by exposition of the contact between turbinal and septum, the use of the probe being again of great value. Errors of refraction in the eye may simulate frontal sinus pain and should be considered.

Reflex pain in the infra-orbital region may simulate the deep-seated continuous ache of *antral infection*, but this latter pain is more often confused with pain due to caries of the canine, premolar or molar teeth. The presence of pus in the nose and opacity of the antrum to transillumination and X-rays enable the diagnosis to be made. The pain in the infected antrum is not affected by pressure, that of the frontal sinuses is increased.

In acute *infection of the ethmoid labyrinth* there may be a pain behind the eyes but this is not a notable sign. The presence of pus, œdema of the middle turbinal and polypus formation are more indicative.

Occipital headache, which is usually persistent, is often the only sign of *sphenoidal sinus infection*, though there may be a post-nasal discharge.

Swellings over the frontal sinus usually mean that the disease has penetrated the outer tables and that there is periostitis at the least. When over the floor of the frontal sinus, swelling must be distinguished from orbital cellulitis. The same applies to swellings due to infection of the ethmoid cells which are caused by acute ethmoiditis and present behind and above the inner canthus, but must be distinguished from those due to inflammation of the lachrymal sac or to orbital cellulitis. Swellings due to infection of the antra are rare, but in acute inflammation may cause an œdema just below the lower eyelid. Swellings in the canine fossa are rarely due to either acute or chronic infection of the antra. They result chiefly from inflammation around the root of a premolar or canine tooth. They may be due to perforation of a malignant tumour of the antrum through its anterior wall, or may be the first sign of osteomyelitis of the maxilla, and when occurring shortly after surgical treatment of an antrum should be regarded with suspicion.

THE THROAT

THE TONSILS—Lesions of the tonsils are usually obvious on examination, but a greatly enlarged tonsil may be parenchymatous only and resolve rapidly, especially

in an adult. A persistent enlargement of this type in a young adult, especially if unilateral, must be regarded as suggestive of possible sarcoma. Tonsils which appear normal in size, or so small as to be hidden beneath the anterior pillars of the fauces, must not be regarded as necessarily healthy. Pressure on the anterior pillar of the fauces with a second tongue depressor may cause a flow of purulent fluid from the follicles, and particularly the supratonsillar fossa, and indicate the chronic septic character of the tonsil. It is this type which gives rise so frequently to distant toxic effects—arthritis, fibrositis, and myositis—and which rarely produces local symptoms. The expression of caseous or calcareous matter does not indicate such active sepsis, but such tonsils are suspect and must be watched. Undue redness of the pillars of the fauces indicates active infection of the tonsils.

The *greatly enlarged tonsil* in active inflammation will be seen to project far beyond the margin of the anterior pillar but will not cause swelling or distortion of the palate. The supratonsillar abscess or quinsy, with which it is often confused, causes a swelling and extension of the anterior pillar and of the soft palate, until the tonsil is overlapped and almost completely hidden from sight. As the quinsy develops, the swelling of the palate increases and the uvula is pushed over to the opposite side. The formation of pus is shown by a localized area of tension which may be visible or may be identified by palpation. This collection of pus is usually nearer the upper molar teeth than is expected, and failure to find it on exploration is usually occasioned by making the incision too near the midline. Another point of distinction between the very large tonsil and quinsy is the ability to open the mouth in the former and the trismus in the latter. Alteration in the voice is commoner with quinsy, dyspnoea occurs more frequently with the large tonsil.

A large *retropharyngeal abscess* extending the whole width of the posterior pharyngeal wall may, if its lower margin be below the level of the tongue, not be immediately recognizable unless the tongue is pressed down. Such an abscess extending only partly across the posterior wall is more obvious, but it must be remembered that if the pharynx is examined with the head rotated towards either shoulder, the projection of the homolateral half of the bodies of the cervical vertebræ will cause a prominence simulating a retropharyngeal abscess. This effect is often produced by examining a child who is sitting partly sideways on its mother's knee and looking forwards to the surgeon. Retropharyngeal abscess suggests either disease of the cervical vertebræ, or of the retropharyngeal glands secondary to septic conditions of the scalp.

Ulceration of the tonsil may be tuberculous, when it causes severe pain on swallowing, is shallow, has bluish undermined edges and a granular base with adherent mucus. Syphilitic ulceration is painless, is either irregular, shallow, serpiginous in the secondary stage, or circular with steep edges and a sloughy base in the tertiary stage. The ulcers of Vincent's angina consist either of flat ulcers with a pink zone of inflammation around, or deep fissures. These ulcers are painful but not necessarily more so on swallowing. The epitheliomatous ulcer has typical everted edges with a firm solid appearance, and a granular base which bleeds easily.

COMMON SYMPTOMS—*Pain in the throat* is due to inflammation and ulceration. Acute inflammations of the pharynx and larynx and commonly of the tonsils give rise to pain which is continuous. In such conditions the pain is usually increased during swallowing, but the more painful degrees of dysphagia are asso-

ciated with ulceration. This is most marked when the ulceration is on the surface of the tonsils and fauces, on the posterior wall of the pharynx, and on the pharyngeal aspects of the glottic walls. It is most severe of all when the ulceration is tuberculous, less severe in epithelioma and least of all in gummatous ulceration. The pain in ulceration of the tonsil region and of the interior of the larynx may be referred to the ear, and this is due to a reflex involving Jacobson's tympanic branch of the glossopharyngeal and of Arnold's branch of the vagus nerves respectively, and may give valuable help in diagnosis.

Inability to swallow may be due to the severe pain experienced on attempting to do so, or may be due to mechanical obstruction to the passage of the bolus irrespective of the presence or absence of pain. This differential diagnosis of the cause of dysphagia can usually be established by the patient's own description or otherwise observation of his attempts to swallow will usually make it clear. Dysphagia from pain is almost always due to lesions already described in the pharynx and larynx, dysphagia from obstruction is due to lesions in the sinus pyriformis, the post-cricoid region and those affecting the œsophageal lumen from within or without. The further examination will require radiography and perhaps endoscopy and cannot be described at length here. It may be mentioned that the presence of a mass of hard glands in the neck occurs at a very early stage of carcinoma of the sinus pyriformis. Difficulty in swallowing the first part of a meal followed by comparative ease and regurgitation after a meal of the first portion of that or of a previous meal are suggestive of a pharyngeal pouch.

Dyspnœa, like dysphagia, is an extensive subject and thus cannot be discussed in detail in this article. It may be due to large swellings in the faucial region which can be readily seen, to inflammatory swellings, to neoplasms and to paralysis of the larynx, or it may be due to obstructive lesions in the tracheo-bronchial tree. Hoarseness is associated with pharyngeal and laryngeal lesions, particularly the latter. Dyspnœa and hoarseness with a normal pharynx mean a laryngeal lesion; dyspnœa with a normal voice indicates a lesion of the trachea, bronchi or lungs. Dyspnœa may be associated with *stridor* and the position of stridor in the respiratory rhythm may indicate the position of its causal lesion. Stridor, if purely inspiratory, is usually laryngeal, if purely expiratory is bronchial, but if it occurs during both inspiration and expiration, a tracheal obstruction is suggested.

Hoarseness is difficult to analyse and does not give reliable indication as to the type of change in the larynx. Any hoarseness makes visual examination of the glottis essential, but it may be taken as a rough guide that a flat toneless and weak voice suggests a paralysis of one or more of the intrinsic muscles of the larynx, a moist bubbly hoarseness suggests an inflammatory cause, and a harsh raucous voice suggests a neoplasm, benign or malignant, or paralysis of the abductor muscles of one or both cords. Complete inability to make any sound, in spite of vigorous use of the lips and tongue, with no dyspnœa, suggests a functional adductor palsy of the larynx. None of these indications is more than suggestive and in every case of hoarseness examination of the interior of the larynx by mirror or by endoscopic tube should be carried out as soon as possible.

Paralysis of abduction and of adduction indicate a lesion affecting the laryngeal fibres of the vagus, between the centre in the medulla and the left bronchus on the left side and the subclavian vessels on the right. Variations in the tone of the

vocal cords suggest asthenic conditions or functional change. Atony usually represents the former and hypertonic changes the latter.

THE EAR

PAIN—The symptom referable to the ear which most frequently brings a patient to his medical adviser is pain. Pain may be referred to different parts of the ear and may be due to a number of causes within and outside the boundaries of that organ. Perhaps the least common cause of pain is a collection of wax in the meatus and this is one good reason why a painful ear should not be syringed without a visual examination of the meatus and drumhead being made. The majority of cases of pain are due to inflammatory conditions in the middle-ear cleft and these are frequently associated with an upper respiratory infection, but not necessarily so. Examination of the drumhead will immediately show evidence of this inflammation—dilatation of the vessels, generalized redness of the drumhead, a bulging due to fluid in the middle ear or hæmorrhagic bullæ on the drumhead or meatal wall. In the early stages when there is redness but no bulging there is no fluid in the middle ear. In some catarrhal cases there is a collection of fluid in the middle ear with a visible fluid level, in others there is bulging of the postero-superior quadrant but the drumhead is translucent and only reddened around the periphery of the bulge. In cases which are proceeding to suppuration the postero-superior bulge is more reddened and the tympanic membrane is opaque. In such cases the bulging only reaches to the handle of the malleus and does not in any way overlap it. When suppuration has occurred the drumhead is more distended and becomes a deeper red or even a bluish red and the bulge overlaps and hides the handle of the malleus. The membrane takes on a bluish-grey appearance, and when this stage is reached rupture is imminent. The usual practice is to apply expectant treatment until the handle of the malleus is obscured, but once that has occurred to carry out myringotomy, as the presence of pus is then established.

The pain of *acute otitis media* is referred to the depths of the meatus, is continuous, and is aggravated by coughing, yawning, and sometimes masticating and swallowing. There is no tenderness on pressure on the mastoid process, nor pain on moving the auricle, but pain can be produced in many cases by pressing upwards and inwards below the meatus, that is with the finger under the lobule and between the mastoid process and the angle of the jaw. This pain must not be confused with tenderness over the tip of the mastoid process. Mastoid infection is rare in the presence of an intact drumhead and in the absence of discharge.

The pain due to a *furuncle* may be severe and subjectively may be difficult to differentiate from that due to *otitis media*. Passive movement of the auricle will aggravate the pain due to a furuncle, but will not affect that due to a middle-ear condition. Examination of the pinna and meatus will usually reveal the swelling due to the furuncle. Pain is a striking factor in a *carcinoma of the meatus*, which can only be distinguished by inspection, when a red granular mass will be seen, easily bleeding, but which may require biopsy for diagnosis. *Osteomas* may cause pain, but as a rule not until they almost occlude the meatus, and a collection of wax and debris obstructs the remaining lumen. Reference has already been made to reflex pain in the ear from ulcerative conditions in the pharynx and it should be remembered that pain in the ear may also arise from lesions of the molar teeth and of the posterior sinuses.

The pain of *mastoiditis* is not severe, but consists of an ache referred either just behind or just above the pinna. Sometimes when the infection is in the zygomatic cells it is referred in front of the ear. Tenderness on pressure is much more a feature and may be very severe. The tenderness may in the early stages of mastoid infection be limited to a part of the process, usually the tip or the area behind the pinna in line with the meatus. In palpating the mastoid process care should be taken not to touch the pinna before diagnosis is established, as such contact would give rise to pain in the presence of a furuncle and might be mistaken for mastoiditis. Tenderness on pressure over the mastoid is often caused by inflammation of one or two small retro-auricular lymph nodes which may be inflamed, and is easily confused with mastoid pain. Careful palpation will reveal the small rounded projection from the mastoid surface, which is often somewhat mobile.

DISCHARGE from the ear may arise in the middle-ear cleft or from the wall of the meatus in external otitis. The presence of mucus in the discharge indicates a *middle-ear infection* and a perforation of the drumhead, as there are no mucous glands in the meatus. In the quite early stages after perforation the discharge may be serous and blood stained, the mucus appearing twenty-four to forty-eight hours after perforation. Blood may appear in the meatus from ruptured hæmorrhagic bullæ on the drumhead in influenzal otitis, but these almost black bullæ can easily be seen on inspection of the meatus. The discharge from the meatus in external otitis is purulent and is accompanied by crusting and irritation.

When *mastoid infection* occurs there is often a notable increase in the amount of discharge and it becomes more purulent, this change being often noticed by the mother if she is looking after the child. Occasionally the discharge ceases and other symptoms increase on mastoid infection. The temperature in mastoid infection is rarely raised above 100° F, if it reaches 102° F or more an intracranial extension, including extradural abscess, must be suspected. Rigors indicate sigmoid sinus thrombosis and a subnormal temperature a brain abscess.

DEAFNESS AND VERTIGO—*Deafness* is a large subject and can only be touched upon lightly. It can be divided roughly into conductive or middle-ear deafness and perceptive or internal ear or nerve deafness.

Inability to hear the lower notes indicates conductive deafness, and deafness to the higher notes signifies perceptive deafness. In the former a tuning-fork is heard longer on the mastoid process than when held close to the meatus. In the latter type the reverse occurs. In perceptive deafness noisy surroundings deafen and confuse the patient, in some types of conductive deafness, especially otosclerosis, the patient hears better in a noise.

Vertigo is a more complex subject even than deafness. It can be caused by lesions of any part of the auditory apparatus from the mouth of the Eustachian tube to the cerebellar cortex. Sudden severe incapacitating vertigo is often caused by Eustachian block. Persistent mild vertigo is frequently due to middle-ear catarrh or suppuration. Violent vertigo with falling and vomiting, pyrexia and deafness is due to infective labyrinthitis. Severe vertigo and vomiting, with headache and other signs of intracranial pressure, indicate the presence of a cerebellar abscess or tumour. Periodic attacks of vertigo with deafness, but with complete recovery between attacks constitute Meniere's syndrome, which is possibly due to changes of pressure in the membranous labyrinth.

NOTES AND QUERIES

PRURITUS VULVÆ

QUESTION—The patient is a married woman aged thirty-two with two children, one aged five and the other fourteen months. Ever since the birth of the second baby (but never previously) she has been troubled with pruritus vulvæ. There is no visible local abnormality, no leucorrhœa, no threadworms, and the urine is free from sugar and albumin. Her periods are quite regular and last four days (menstrual cycle 4/28), and during the days she is menstruating she is completely free from the pruritus. Immediately the menstrual flow ceases the pruritus returns and remains until the next period starts. She is neither under- nor overweight for her height and she breast-fed the last baby for six months. I should be grateful for an explanation of the relief she obtains during menstruation, of the probable cause of the pruritus, and suggestions for treatment.

REPLY—Pruritus in the absence of organic disease is rare and is then usually attributed to some psychological factor. A diagnosis of this kind is made with reluctance, except as a last resort. It is significant that the symptoms of pruritus began after the birth of the second child and, though there appears to be no leucorrhœa, there may be a mild discharge which is unnoticed and of an irritating character. In many of these cases there is an ectropion and the cervical mucosa becomes exposed. From the above it might appear that I am suggesting that an examination may have been incomplete, but I wish to emphasize that frequently a small tear can be easily overlooked. The pruritus due to this cause is usually absent during the period, and is probably explained by the dilution of the irritating discharge by the blood. As regards treatment, if a small tear is present, then it should be repaired. The skin of the vulva should be protected with frequent applications of calamine ointment. In the absence of any organic cause X-ray therapy may be successful.

DOUGLAS MACLEOD, M.S., F.R.C.P.,
F.R.C.S., F.R.C.O.G.

AN UNUSUAL CAUSE OF NOCTURNAL ENURESIS

A YOUNG man complained of distressing and constant nocturnal enuresis since childhood. Cystoscopy revealed nothing abnormal, but X-ray examination showed a large shadow in the region of the sacral promontory; this could not be felt per abdomen, per rectum or manually. Laparotomy revealed a calcified cyst in the mesentery hanging into the pelvis, which was removed. I am sending this as an interesting cause of nocturnal enuresis. On section the mass

was a collection of old and calcified glands, probably originally tuberculous in nature.

K. L. S. WARD, M.B., CH.B.
Brasted, Kent

MORPHINE IN THE TREATMENT OF BURNS

QUESTION—A subscriber writes—I was most interested in the article on the treatment of burns by Mr R. H. Franklin in your March issue, but I am unhappy about the dosage of morphine which he recommends. He suggests $\frac{3}{4}$ grain for a strong adult in the treatment of shock, and goes on to say that if the effect wears off during the cleaning-up process an intravenous injection should be given, thus on another page he puts at $\frac{1}{2}$ to $\frac{1}{4}$ grain. What I am somewhat worried about is the total dosage to be used during the first twelve hours, for example, if the burn is severe.

REPLY—It is usually safe to give a further injection of morphine if the patient continues to have pain. The general principle should be that the first dose is adequate, the reinforcing dose may be smaller and, because a quick effect is desired, as in the cleaning-up process, it should be given intravenously. After this injection no more morphine should be given for four hours. As a general rule the total amount of morphine spread over the first twelve hours should not exceed 1 grain for a strong adult.

R. H. FRANKLIN, M.B., F.R.C.S.

GLYCINE IN IDIOPATHIC MUSCULAR DYSTROPHY

QUESTION—I have a female patient aged forty with idiopathic muscular dystrophy. I have prescribed for her one teaspoonful of glycine, to be taken three times a day, over a period of five weeks. The improvement in the patient's well-being is most marked, and the improvement in muscular power quite amazing. I should like to know for how long glycine can be given, and if it will be necessary for the patient to be given courses of it for the rest of her life. I should be interested and grateful for any advice in the treatment of this disease.

REPLY—Idiopathic muscular dystrophy in a female of forty is rare and the question of correct diagnosis is important. There is some evidence that glycine delays the progress of the muscular dystrophies of childhood, but "amazing" improvement I have never seen. However, the practical point is that there is no contra-indication to the continued use of glycine, in the dose named, so long as it appears to benefit the patient.

F. J. NATTRASS, M.D., F.R.C.P.

circinata which has spread peripherally; the whole raised margin is sprayed once daily for two successive days. In ringworm of the hands and feet the lesions are more destructive, and long-standing cases which have been under treatment for some time require three to five weeks' treatment with the spray. After the first week of daily applications they are given on alternate days. The first spraying is applied only round the margins of the lesions, but as healing proceeds the spraying is confined to the islands of denuded epithelium, the whole surface being covered. Tinea-like pompholyx on the hands responds to one or two applications of the spray. The ethyl chloride is easily applied and no bandages are required except when closely covered surfaces are affected, such as the foot. The intense reaction is quietened by the second or third application. It is stated that no sensitization dermatitis is produced, natural healing is aided, the itching disappears after the second application, and in affections of the hands in which there is inflammation and pain, making flexion of the fingers difficult, these symptoms disappear with the itching. There are no contraindications to the use of the ethyl chloride spray, even when the lesions are covered by pustular eruptions due to secondary infection, and the method is stated by the author to be superior to the use of any other fungicide.

THE DIAGNOSIS OF MARCH FRACTURE

As in most cases of march fracture there is no history of direct trauma and physical signs are comparatively few, diagnosis of the condition may be missed. This fact is stressed by Surgeon-Lieut. J. K. Salmon (*Journal of the Royal Naval Medical Service*, January 1944, 30, 1) who gives particulars of the symptoms, the physical signs and X-ray findings. The fracture, which most commonly involves the third and fourth metatarsal bones, although it has been reported occurring in the fourth and fifth, is always transverse, across the neck or distal end of the shaft, and there is no displacement. There is usually a history of gradual onset of pain in the metatarsal region and, although the patient may report some minor indirect injury which in itself would seem to be insufficient to cause a fracture, a history of trauma is usually absent. Unaccustomed exercise, such as physical training or marching, or long periods of standing, are predisposing factors, and ill-fitting footwear plays a part. Physical examination reveals little apart from slight redness over the dorsum of the foot and, as a rule, tenderness over the metatarsal bone involved. Non-weight-bearing movements are full and painless. X-rays may be

negative on first examination (this point is stressed and the need for repeated examination in suspect cases), the earliest sign is slight raising or thickening of the periosteum around the neck or shaft of the affected bone, which gradually becomes more evident and is accompanied by ill-defined osteoporosis of the cortex in the region. A transverse crack, characteristically described as a "fine hair-like crack," may now be seen and the density of the periosteal elevation increases. The danger of mistaken diagnosis, when a patient is first examined at this stage, is emphasized, the most important condition to be differentiated is sarcoma, but the symptoms may also be mistaken for those of syphilitic periostitis or of Köhler's disease. Treatment consists of immobilization and rest.

THE VALUE OF X-RAY DIAGNOSIS IN ACUTE MASTOIDITIS

With a view to determining whether or not bone involvement is present in cases of acute mastoiditis and also to facilitate operation by obtaining information concerning localization, the form and size of the pneumatic cells and variation in the position of the tegmen and sinus, the value of X-ray diagnosis in cases of acute mastoiditis is stressed by G. Politzer (*Indian Journal of Surgery*, December 1943, 5, 30). Using the projection of Schueller, the earliest pathological changes to be seen are opacity of the pneumatic cells, involvement of the bone evidenced by decalcification of the trabeculae or superficial destruction of the walls of the cells, usually a combination of both symptoms is present. There is considerable variation in the localization and extension of the changes. In most cases the centre of destruction is in the mastoid process. In others it is round the antrum or in the zygomatic process of the temporal bone. Decalcification may be general and the superficial destruction of the trabeculae involve the whole pneumatic system in the form of a necrosis, or total sequestration or, more rarely, osteomyelitis or mastoiditis may be present. In the adult these changes can be easily seen, but in children and aged patients there may be some difficulty, in the first instance because in children calcification of the bone is somewhat poor and thus changes may escape observation, and in old people regressive changes in the mucosa and pneumatic cells must be taken into consideration. When otoscopy is impossible, as in cases of otitis externa, stenosis after burns, or fractures, this method of examination is essential so that it may be determined whether or not an affection of the middle ear and pneumatic system is present.

REVIEWS OF BOOKS

Bronchiectasis Pathogenesis, Pathology and Treatment By JAMES R. LISA, B.S., M.D., and MILTON B. ROSENBLATT, B.S., M.D. (Oxford Medical Publications) Oxford University Press London Humphrey Milford, 1943 Pp 190 Illustrations 40 Price 21s

THIS monograph by a pathologist and physician is out to give a review of the pathogenesis, pathology and treatment of bronchiectasis. In any respects it is an admirable account, and it falls short of excellence in that the advances which have taken place in the management of the disease in the last fifteen years, and which ought to take a prominent place in any review of the subject to-day, are given scant attention. Appropriately the authors begin with an account of the anatomy and histology of the bronchial tree. Here they are precise and up-to-date, but it is a pity that they do not give reproductions of normal bronchograms to illustrate their description. On the pathogenesis of the disease they give a fair review of conflicting theories, and the unsatisfactory character of the evidence by which congenital types are judged is squarely faced. The importance of atelectasis as an antecedent of bronchiectasis is admitted and the experimental evidence given in some detail. The pathological studies of Erb, Robinson, McNeil, Kline, Ogilvie, Aschner and Lander, and Davidson are reviewed at length, and to these are added details of the authors' own series of cases. The value of these is diminished by the fact that in most of them bronchiectasis was an incidental rather than a major feature, and in many even a terminal affair. But they provide a fine series of illustrations of the histological changes, which show well the nature and importance of the inflammatory element in the bronchial wall. The clinical aspects of bronchiectasis are given an adequate review; but the account of the radiological features, particularly bronchography, leaves much to be desired. This is an aspect of the disease eminently suited to good illustration, yet the authors not only limit themselves to four reproductions of bronchograms, which are quite inadequate to illustrate the different types of dilatation, but these four, as they are, are hardly samples of good bronchographic technique. The section dealing with diagnosis is short and inadequate, and the account of surgical treatment is entirely limited to a brief discourse on the literature without any attempt to survey the practical details of selection and management. Nor are the modern

advances in the use of postural drainage more adequately served. These are omissions which must seriously affect the value of the book, and it will be useful chiefly for those searching for a quick review of the old literature rather than for those who wish to learn something of the modern investigation and the care of these patients.

The Blood Pressure and its Disorders, including Angina Pectoris By JOHN PLESCH, M.D. (Berlin), L.R.C.P. and S. London Baillière, Tindall and Cox, 1944. Pp viii and 149 Illustrations 61 Price 15s

ALTHOUGH the author has tried to avoid so far as possible repetition of matter contained in his previous book "The Physiology and Pathology of the Heart and Blood Vessels," brought out by the Oxford University Press in 1937, the two books inevitably overlap. In dedicating this book to his friend the physicist Abraham Joffé, winner of the highest Stalin prize and organizer of the physical resources of the Union of the Soviet Socialist Republic, the author expresses his friendship to a great scientist and also a small fraction of the gratitude felt towards the whole Russian people. The book falls into three parts—(1) arterial blood pressure, (2) venous blood pressure, and (3) angina pectoris. Capillary blood pressure might come under consideration, as blood pressure is an integral function of the body as a whole. The easy days are now long past when the practitioner was content to put a pressure sleeve round the arm and to read off on a monometer the pressure required to make the pulse disappear. From such primitive beginnings the measurement of blood pressure has grown into a science. In the preface the author acknowledges with gratitude the help given by his son Peter H. Plesch, B.A., A.I.C., in the preparation of the text.

Plastic Surgery By GEORGE BANKOFF, M.D., D.Ch., F.R.F.P.S., F.R.C.S.E. London Medical Publications Ltd, 1944. Pp 372 Illustrations 560 Price 30s

THIS book is divided into three parts. The first describes the general principles of plastic surgery; it includes chapters on anatomy and physiology, the technique of cutting flaps and grafts, scar excision, and the treatment of benign tumours and congenital defects. The second describes the plastic surgery of the face and in chapters on the treatment of def

the facial contour, the pilatory system, wrinkles and allied defects. The third gives a short account of the plastic surgery of the body. It is primarily concerned with mammoplasty but also describes the treatment of congenital deformities of the limbs and the use of prosthetic appliances. Those who seek information about the treatment of war wounds and burns will be disappointed. The emphasis is laid on cosmetic surgery and the correction of deformities. There is not enough advice on wounds or burns to make the inexperienced surgeon confident of selecting the correct method of repair or of carrying out the technical procedures involved. Notable omissions are the three-quarter thickness graft cut with the dermatome and patch grafts used on granulating surfaces, both have proved their worth in this war. The plastic surgery of peace time—cosmetic surgery and the correction of congenital and acquired deformities—is more fully described. The text is lucid and the illustrations clear. Several of the methods advocated are not those in general use by British plastic surgeons to-day, for example, the Italian flap in rhinoplasty, Lexer's operation for facial paralysis, Langenbeck's operation for cleft palate and tendon lengthening for Dupuytren's contracture. But the illustrations bear witness to the satisfactory results obtained at the author's hands by the methods recommended.

Supplement to the Dental Treatment of Maxillo-Facial Injuries By W. KELSEY FRY, M.C. M.R.C.S., L.R.C.P., L.D.S., R.C.S., P. RAE SHEPHERD, L.D.S., R.C.S., ALAN C. MCLEOD, D.D.S., B.Sc., I.D.S., R.C.S., and GILBERT J. PARFITT, M.R.C.S., L.R.C.P., L.D.S., R.C.S. Oxford: Blackwell Scientific Publications Ltd., 1944. Pp. 494. Plates 104. Price 21s.

THE authors have produced this book as a supplement to their book on maxillo-facial injuries so as to illustrate various points by recording actual cases treated at their hospital. The recording of these cases shows clearly the many problems which arise in the treatment of fractured jaws. The chapter on the treatment of fractures of the middle third of the face is particularly helpful. The authors have again committed the error of stressing the technical side of treatment at the expense of the pathological and surgical sides, much of the mechanical details, including their photographs, could be compressed with advantage. In this respect the chapter dealing with complications of fractures might be modified. Those dental surgeons interested in the technical side of the treatment will find the book most helpful.

Medicine in Britain By HUGH CLEGG
London: Longmans Green & Co., 1944.
Pp. 46. Photographs 10. Price 1s.

THIS most attractively written monograph which is published for the British Council as no. 17 in the "Life and Thought" series, gives a brief survey of the growth of medicine from as far back as the fifteenth century, when Henry VIII instituted the regulation of medical practice and granted a Charter to the College of Physicians of London. An interesting section from the historical point of view is that devoted to the Indian Medical Service, which had its origin in the granting of a Charter to the East India Company by Queen Elizabeth in the year 1600. The monograph does not only deal with historical facts, however, and practitioners will do well to acquire a copy of this authoritative presentation of the vast subjects of medical research and practice, which, although condensed into forty-six pages, gives a clear outline of the history, present-day facilities and plans for the future.

NEW EDITIONS

DURING the ten years that have elapsed since the appearance of the previous edition of *The Radiology of Bones and Joints*, by JAMES F. BRAILSFORD, M.D., F.R.C.P., there have been many advances in the radiological examination of bones and joints, particularly as regards the recognition of disease conditions in their early stages. The third edition (J. & A. Churchill, Ltd., 45s.) is a thoroughly up-to-date presentation of the subject and represents the author's careful follow-up of cases, in some instances for periods as long as twenty-five years. The results of these investigations should prove of great value in the diagnosis and prognosis of abnormalities, deformities, injuries and diseases of the bones and joints. Traumatic and occupational injuries are included. In many instances a short outline of the necessary treatment is given and the results obtained thereby. The book is generously illustrated, the figures totalling 404, and a most useful bibliography is included. Both author and publishers are to be congratulated on the production of a work which bears little evidence of war-time restrictions and difficulties.

CONSIDERABLE revision has been undertaken in the preparation of the eighth edition of *Surgical Nursing and After-Treatment*, by H. C. RUTHERFORD DARLING, M.D., M.S., F.R.C.S., F.R.F.P.S. (J. & A. Churchill, Ltd., 12s. 6d.), and the result is a most comprehensive presentation of surgical nursing in all its aspects. The book is well illustrated and some useful formulae and recipes have been included. Practitioners will

REVIEWS OF BOOKS

and much of value in this book. The techniques of different tests, of infusions and blood transfusions, the treatment of burns, diaphragmatic hernia, the treatment of shock; duodenal drainage and catheterization, post-operative hæmatemesis, these are among the many subjects described in detail. A section giving an outline of the correct treatment is included in each chapter, which in some instances perhaps rather oversteps the dividing line between nursing and medical practice.

Massage and Remedial Exercises, by NOEL M. LLOYD, in its sixth edition (John Wright and Sons Ltd., 25s) has been enriched by the addition of a number of new illustrations in the chapters dealing with fractures. These chapters have also been largely rewritten to bring them up to date with modern methods of treatment, methods which strongly advocate the use of graduated movements for rehabilitation. In view of this modern trend the new edition of this well known book will be warmly welcomed.

First Aid in War, by F. A. HAWKSWORTH, M.B., although not written by a qualified medical man, contains many useful points concerning the different aspects of first aid. It is of interest to note that this first edition is to be printed in the Dutch language for use in the Dutch Army and for the medical services when the day of Holland's liberation arrives. Copies of the book, price 1s 4d, can be obtained from the author, 40 York Road, Tunbridge Wells, Kent.

MANY surgical procedures of topical interest are included in the third edition of *Modern Operative Surgery*, Volume 2, edited by G. GREY TURNER, LL.D., DCH., M.S., F.R.C.S., F.R.A.C.S. (Cassell and Company Ltd., 55s) and it is therefore difficult to single out any for special mention, but in view of the injuries of modern warfare the chapter on plastic surgery by Sir Harold Gillies will no doubt prove of great interest. The new edition is well produced and richly illustrated, containing in all 555 text figures and 4 plates.

The Theory of Occupational Therapy, by NOEL M. LLOYD, M.B., M.R.C.P., D.P.M., and E. MARY MACDONALD, in its second edition (Baillière, Tindall & Cox, 7s 6d) deals with the subject in all its aspects. The value of occupational therapy, both physically and psychologically, is stressed in the preface by Sir Robert Stanton Woods, and its use in the treatment of mental cases as well as those suffering from physical disabilities and injuries is clearly seen on perusal of this little book.

Vade Mecum of Medical Treatment, by W. GORDON SEARS, M.D., M.R.C.P., has been subjected to some revision in the preparation of the fourth edition (Edward Arnold & Co., 10s 6d) and minor alterations in accordance with recent advances have been made. The work is too well known to call for detailed criticism, and it remains but to add that the new edition will be found as thoroughly satisfactory and useful as its predecessors.

MUCH work has been expended on the production of the illustrations to the eighth edition of *Demonstrations of Physical Signs in Clinical Surgery*, by HAMILTON BAILEY, F.R.C.S. (John Wright & Sons Ltd., 25s) and both author and publishers are to be congratulated on the happy results obtained. Illustrative figures play an important part in this well-known textbook, which has served as a diagnostic guide to many students and practitioners since its first appearance in the year 1927, and the addition of some new illustrations brings the total to 492. Revision of the text has been carried out in some places. The new edition is assured of a warm welcome.

A NUMBER of additions have been made to the chapter on Eye Diseases in the Tropics in the preparation of the fifth edition of *A Handbook of Ophthalmology*, by HUMPHREY NEAME, F.R.C.S., and F. A. WILLIAMSON-NOBLE, F.R.C.S. (J. & A. Churchill Ltd., 18s), and the important question of vitamin A and eye health as well as the use of the sulphonamide drugs, particularly in the treatment of conjunctivitis, are among additions to other sections. New surgical procedures for the treatment of glaucoma, ptosis, iridodialysis and vertical palsy, a number of new prescriptions and 12 plates in addition to 189 figures in the text are other features of this new edition, which is beautifully produced in spite of war-time restrictions.

NOT only to radiologists and specialists in cardiovascular diseases will the appearance of the second edition of *Clinical Roentgenology of the Cardiovascular System*, by HUGO ROESLER, M.D., F.A.C.P. (Charles Thomas Illinois London, 41s) be welcome, but clinicians and general practitioners will find it of great help in diagnostic problems. The work is richly illustrated, containing 337 figures in all, and each illustration is supplied with a detailed caption, a feature which, although introduced somewhat apologetically by the author in the preface, contributes greatly to the practical value of the work. The new edition is beautifully produced and there is a rich bibliography.

EDITORIAL ANNOUNCEMENT

THE EDITORSHIP

THE PRACTITIONER announces with regret that, owing to age, Sir Humphry Rolleston has resigned from the position of editor, which he has so successfully filled since 1928. Dr Alan Moncrieff, who has been associated with Sir Humphry since 1934, will act as sole editor until further notice.

NOTES AND PREPARATIONS

PETHIDINE HYDROCHLORIDE—A review of the properties and uses of this synthetic analgesic and antispasmodic drug, based on the results of extensive clinical studies, has been published by the manufacturers, Burroughs Wellcome & Co., 183-193 Euston Road, London, N W 1, and copies are available to members of the medical profession on application.

'PROSTIGMIN'—As a result of large-scale production due to increased demand the manufacturers of this synthetic parasympathetic stimulant have been able to make a substantial reduction in the prices of the oral tablets of 15 mgm., 20 of which will now cost 6s 8d, 100, 30s, and 250, 68s, subject to medical discount and no purchase tax. The manufacturers are Roche Products Ltd, Welwyn Garden City, Herts, who also announce the issue of 'BEFLAVIT' VITAMIN B₂ tablets of 3 mgm. in bottles of 25 and 100, and 'Beflavit' ampoules of 1 and 5 mgm. in boxes of six. Particulars can be obtained on application.

THE BRITISH PHARMACEUTICAL CODEX, 1934

The sixth Supplement to *The British Pharmaceutical Codex*, 1934, containing additions and amendments to Parts I, II and III, has just been issued. The additions to Part I comprise new monographs on substances contained in the Sixth Addendum to the British Pharmacopœia, and monographs on surgical catgut. The Part II additions and amendments, occasioned by wartime conditions, concern surgical dressings in the manufacture of which rubber and silk are involved, and those to Part III include changes in formulæ of ointments with white paraffin base and preparations which involve the use of alcohol. A copy of the supplement can be obtained from the Pharmaceutical Press, 17, Bloomsbury Square, London, W C 1, price 2s 6d, remittance with 2d postage to be sent with the order.

ECONOMY IN THE USE OF DRUGS

The revised edition of the Medical Research Council's War Memorandum No 3, by the Therapeutic Requirements Committee, con-

tains references to the reclassification of ascorbic acid and vitaminized oil under B (strong economy) and cod-liver oil under A (readily available). Desoxycorticosterone acetate is reserved for the treatment of Addison's disease and quinine preparations for the treatment of malaria. The new edition also contains the authorization under the Scarce Substance Order, S R & O, 1942, No 709, of the use of pharmacopœial concentrated tinctures or liquid extracts diluted with water in place of alcoholic tinctures.

MEDICAL FILM SCABIES

The film dealing with the subjects of diagnosis and treatment of scabies produced recently by the Ministry of Information at the request of the Ministry of Health has had a most successful reception and has been widely shown to medical practitioners, nurses and others interested in the subject. A second film, entitled "The Scabies Mite," which lasts for only seven minutes, has been prepared, and can be used separately or in conjunction with the film dealing with diagnosis and treatment. Information concerning arrangements for the exhibition of these films can be obtained from the Ministry of Information Regional Offices, or from the Central Film Library, Imperial Institute, South Kensington, S W 7.

CONTENTS FOR JUNE, 1944

- DISORDERS IN WARM WEATHER
Water Metabolism in Relation to Hot Weather
 By Professor J. M. O'Connor, M.D.
Summer Sports By Sir Adolphe Abraham, O.B.E., M.D., F.R.C.P.
Public Health Aspects of Diseases Prevalent in Warmer Weather By E. H. R. Smithard, M.D., D.P.H.
Skin Disorders of Warmer Weather By James Sommerville, M.B., Ch.B.
Diet Modifications in Hot Weather By Mrs R. M. Simmonds, S.R.N.

The Interpretation of Physical Signs VI—*fr Gynaecology* By V. B. Green Armytage, M.D., F.R.C.P., F.R.C.O.G.

WATER METABOLISM IN RELATION TO HOT WEATHER

By J M O'CONNOR, M D

Professor of Physiology, University College, Dublin

THE word metabolism in its primary meaning is limited to chemical changes which occur in the living animal but it has been extended to include the study of substances which undergo no chemical alteration in their passage through the body. Whilst it is true that some water is produced by the oxidation of foodstuffs, the amount is so small in proportion to the total that it may be disregarded when attention is directed to distribution of water through the body and its manner of leaving in the excreta and by evaporation. Water is so large and essential a compound that it would be possible to write an account of the whole of physiology in relation to it. When, however, as in this article, it is linked with heat it is necessary to deal with it only in so far as it is related to temperature regulation.

The constancy of the body temperature depends in the end on two physical properties of water, i.e., its high specific heat which allows an easy distribution through the circulation of the heat produced in cellular oxidation, and its high latent heat of vaporization through which, when necessary, heat may be copiously lost by evaporation from the surfaces. It is therefore proposed to consider briefly the distribution of water through the body and its manner of leaving it as vapour, to examine the mechanisms by which the temperature of the body is maintained when heat loss is rendered difficult and to see in what ways these are interlaced.

DISTRIBUTION OF WATER IN THE BODY

The water in the body is divisible into three phases—the water in the cells, the water in the intercellular spaces, and the water in the blood plasma. All these are in slightly constrained communication, in consequence of which a proportion in their amounts is maintained. Whilst the idea has been entertained that they are kept apart by active metabolic processes occurring in cells or cell membranes, it can scarcely be doubted now that the demarcation is the result of the osmotic properties of the membranes covering the tissue cells and of the walls of the capillaries. It has been shown by Conway and his co-workers (1941) that the muscle cell is covered by a membrane which, although it allows free passage of water, of the positively charged potassium and hydrogen ions and of the negatively charged chlorine and bicarbonate ions, does not allow sodium to pass into the cells or the large negatively charged phosphatic ions or proteins to leave. In consequence, the osmotic pressure of the positive sodium ions of the intercellular water, holding in conjunction chlorine and bicarbonate ions, is balanced on the inside by an equivalent concentration of the large negative phosphatic and other ions holding equivalent quantities of potassium. The application of the Donnan equilibrium, according to which the ratio of the sodium inside the cell to :

the cell should be large, and should be identical with the ratio of the chloride ion in the reverse order, is borne out by experimental observation

The blood coursing through the intercellular water is prevented from mixing with it by the capillary walls, which are freely permeable to all constituents of the plasma except the plasma proteins. The osmotic pressure of this plasma protein though small in amount, is adequate to prevent the plasma from leaving the vessel under ordinary capillary pressure. This is but a delicate restraint and a small increase in the capillary pressure may cause the circulatory fluid to leave and mix with the intercellular water, from which it can return only through the lymphatic system. There is one point at which there is no such separation, for in the liver the capillary endothelium is incomplete. Here the capillary pressure will be consistently low so that there is no danger of the blood being driven out of its channel and the mixture of the two fluids which are kept apart elsewhere is intimate. In general, however, the separation is maintained. It might be expected that the volumes of plasma water and intercellular water would vary inversely but the available evidence indicates that this is not usual. Both increase or decrease together and a small increase in plasma volume is associated with a large increase in intercellular fluid. It has been shown that the dog has per kgm. weight between 35 and 65 c. cm. plasma and 230-425 c. cm. available fluid (Gregerson and Stewart 1939). The position in which fluid is to be found is governed altogether by osmotic forces. There is no reason to believe that it is possible to store any absorbed fluid or absorbed salt in concentrations which would differ osmotically from the general levels obtaining throughout the body.

HEAT BALANCE AND HEAT LOSS

The regulation of the body temperature is involved and full of interest but can be dealt with here only in a summary manner. Fundamentally the constancy of the temperature must depend on a balance of heat loss against heat production. Under normal conditions this balance is usually maintained by a regulation of the heat loss. Heat is lost by conduction from the skin to the surrounding air, by radiation to surrounding cold objects, by evaporation consequent on the drying of the skin and by evaporation from the respiratory passages. The loss by drying cannot be substantially reduced below a minimum, and regulation in neutral or warm conditions is achieved by varying the temperature of the skin through increase or decrease in the warm blood flowing through it, and by increase in evaporation consequent on the flooding of the surface with secreted sweat. The flow of blood through the skin is regulated by a control of vasomotor tone of the skin arteries under the influence of the temperature of a centre situated in the hypothalamus and by reflex effects from the skin itself. It is, however, also governed by effect of temperature directly on the arteries of the skin. When the skin changes temperature the blood vessels, even when cut off from the central connexions, are constricted when cold and dilated when warm. This is the mechanism which in part explains the fact that even when the centres are completely cut off from the trunk the temperature of the body is well maintained. For although the theory of the regulation of temperature has long been dominated by the conception of central control, it is now established that a comparatively efficient constancy may be maintained when the centres have been isolated by destruction of the cord below the origin of the phrenic nerves.

The ordinary evaporation from the skin and air passages is responsible for about

25 per cent. of the total heat loss but as soon as external conditions no longer favour heat loss this is greatly increased by a simultaneous outburst of sweat all over the body—the palms of the hands and the soles of the feet constituting curious exceptions (Kuno, 1934). This outbreak of sweating can, it is believed, result from increase in the temperature of a centre in the hypothalamus but it is also subject to reflex influences. Sweat contains salt, not always in the same amount, and figures varying from 0.2 to 0.95 per cent. "sodium chloride" can be quoted

MAINTENANCE OF BODY TEMPERATURE

These then are the mechanisms by which the temperature is kept from increasing under warm conditions and the title of this article would appear to limit discussion to these facts. But to understand the position something must be said also about the maintenance of the temperature when even the vasomotor loss is cut to a minimum. Temperature maintenance then becomes possible only by immediate increase in heat production, and of this there are two sources. One of these, shivering, is a reflex activity of muscle which need not be further discussed. The second depends upon a general increase in the activity of tissues when the temperature has fallen below the normal (O'Connor, 1943). This is a property of the cells independent of any central effect. It is responsible for the constancy of the temperature in cold surroundings which exhibits itself after a period of recovery when the spinal cord has been destroyed. It can be regarded as the fundamental phenomenon in temperature regulation, and it is to it that all other influences on temperature, whether routine or unusual, should be related. Evidence has been given (O'Connor, 1943) to show that it is the result of a control of oxidation by an adsorption of fatty acids on surfaces in the cell, and that the change which occurs at normal temperature and on which the regulation of temperature depends is due to the solution of palmitic acid when the temperature passes above this point. This solution point of palmitic acid will be governed by conditions within the cell and any alteration of these may upset the standard temperature causing it to rise or fall.

REGULATION IN HOT AREAS

During the ordinary conditions of life in temperate zones there is no difficulty in getting rid of all the heat which is produced, and excessive heat loss is commonly avoided by variation in the amount of clothing or by artificial heating. In warm conditions, whether they be climatic or industrial in origin, the loss of heat may be difficult to the verge of danger. It is remarkable that there is no part of the world so cold or so warm that warm-blooded animals cannot maintain their temperature, and even more curious that no part of the earth's surface is uninhabitable by man solely because of its temperature conditions. But in some places the mechanisms of heat loss must be near the limit. It is recorded that in certain regions of Australia, whilst the temperature at rest is normal, walking at a leisurely pace for half an hour may force it up to 102° F.

When such a mild disturbance produces so marked an effect it is to be expected that severer conditions will result in complicated disturbances verging on or reaching disaster. The effort to get rid of the heat of the body may, when successful, result in changes which the body cannot tolerate. Under such conditions heat collapse and heat pyrexia arise. It is into the sequence of events which lie behind these that inquiry is necessary. They are particularly likely to result when the external temperature is above the normal body temperature, for under such conditions radiation and conduction, by which the body in temperate conditions

SUMMER SPORTS

BY SIR ADOLPHE ABRAHAMS, OBE, MD, FRCP

Physician, Westminster Hospital, Medical Officer to the International Athletic Board and the British Olympic Athletic Team

ALTHOUGH the present intention is to deal with some general principles of exercise and sport in their physiological aspect, the introduction of a seasonal association has been suggested by habit and tradition—the light and warmth of the summer months stimulate an interest and activity only too frequently neglected during the greater part of the year. It is this very restriction or limited application which encourages investigation. There is a tendency in the sedentary worker to plunge abruptly into strenuous exercise as an essential feature of his summer holiday, as if with the idea of neutralizing the ill-effects of muscular inactivity and possibly of storing up for utilization throughout the winter some advantages which have been acquired from a short period of comparative physiological righteousness.

The relation of physical exercise to optimum health—perhaps the much over-worked modern expression “positive health” might be legitimately employed in this connexion—cannot be dogmatically expounded. In respect to the manual worker, it is not to be expected that muscular effort deliberately undertaken in addition to daily toil will be welcomed for its recreational or hygienic value. But civilization, and especially urbanization, with all its implications, encroaches more and more upon the primitive features of manual labour which had undeniable physiological advantages, and it may well be that the thwarted instinct for physical toil finds an outlet in something strenuous and competitive. Yet general pronouncements are easily criticized. Individual requirements are accepted as a matter of course regarding most functions of life and living; variability and idiosyncrasy are not disputed in respect of the amount and nature of food intake, of sleep, capacity for occupation, and such more debatable considerations as tobacco and alcohol. The same philosophy may be extended to exercise. Examples are easily forthcoming of a lifelong antipathy towards any form of avoidable physical exertion compatible with perfect health and longevity, although it is arguable that these are exceptional and that from exceptional cases no useful conclusions may be drawn. Alternatively, there is the equally healthy long-lived individual who attributes his well-being to regular diurnal exercise. Yet both may be right, the adaptation to a routine of activity or inactivity may be a correct explanation of the apparent contradiction, and a reversal of habits in both cases might be ultimately satisfactory. The arbitrary assumption of constitutional differences is, of course, the other convenient explanation.

THE WAY OF A HOLIDAY

On the principle occasionally advanced, with more or less seriousness, that a holiday should provide as nearly as possible an extreme contrast to the usual way of living it is only to be expected that the sedentary worker is tempted towards a feverish application to any form of sport which circumstances provide or the recollection of youthful participation encourage. The disadvantage and even the danger of

such an enterprise have frequently been asserted, in particular the risk of subjecting the cardiovascular system to a stress which is considerably greater than the demands of everyday life. In all probability, the risk of serious consequences of this kind is exaggerated, especially when a healthy myocardium and coronary vessels are admitted. But on general principles, and certainly on less debatable ground, the foolishness of a sudden transition from physical sloth to extreme activity is obvious. Leaving out the possibility of "cardiac strain," the body as a whole cannot accept the increased obligations. The muscles, the joints, the essential biochemistry and the nervous system are implicated in the process of training which is essential for the enjoyable and beneficial effects of exercise. Otherwise a state of fatigue and exhaustion is induced and the participant may return from his holiday in need of a rest cure rather than refreshed and prepared to take up the daily burden anew. Indeed, complete relaxation and extreme laziness would be preferable for the man who accepts violent exercise as a kind of medicinal accompaniment of his holiday, or who may be regarded as the victim of a compulsive neurosis.

That the physical side is only one feature and not the whole content of exercise and sport is frequently forgotten. The psychological or recreative element is often overlooked. Yet one man's pleasure is another man's madness. The exercise which gives unqualified satisfaction to one may be interpreted as boredom by another, and even as a form of torture by a third. It is fortunate that on holiday, individual taste as a rule dictates the choice so that, provided it is appreciated that muscular activity as such is not to be regarded as nasty if wholesome medicine, no harm is likely to accrue. Even at the risk of over-simplification it may be said that the part occupied by exercise in the annual holiday as regards both type and extent must be left to the good sense and instinct of the individual.

BATHING

A special word of reference is perhaps called for in the case of bathing which in this country at any rate looms largely as a holiday attraction. Open-air bathing introduces a peculiar feature apart from the exercise, namely, the more or less prolonged exposure of the body to a low temperature. The general question not infrequently asked, which cannot possibly be answered in a form which can be of value to an individual, is "at what age should bathing be abandoned?"

The race of the all-the-year-round cold bathers is disappearing and the younger generation born and bred in a world of constant hot water have not acquired the habit. It may well be therefore that the age limit for bathing must be set at a lower level to cater for those unused to the old-fashioned spartan experience, for there are many pathological aspects of cold application and heat deprivation which inspire words of caution.

THE PROBLEM OF HEAT

Even assuming the integrity of the cardiovascular system and the possession of a reserve which is in excess of any demands that could be imposed by the most violent exercise that can be undertaken, can any disadvantageous or dangerous consequences be envisaged? Some reference to the possibility of hyperpyrexia is clearly desirable. A machine works best when it is hot and the various biochemical processes concerned in the activity of vital machinery are enhanced by a rise of temperature. In strenuous exercise a (rectal) temperature of 102°F is quickly

reached. The subsequent body temperature depends upon the severity and duration of the effort and the opportunities for heat loss. The principal channel for heat dissipation is by perspiration and this depends upon climatic conditions, the temperature and humidity of the atmosphere, the presence of wind. I found on one occasion after running for an hour (9 miles) on an afternoon in July when the shade temperature was 90° F a subsequent rectal temperature of 105.5° F. It can be readily visualized how a more strenuous protracted effort, such as a Marathon race— $26\frac{1}{4}$ miles at the rate of 10 miles per hour—might produce a substantially higher temperature, especially if run on a day particularly unfavourable to heat loss. I do not know at what stage of pyrexia irreversible changes in vital tissues might be expected and experiments *ad hoc* would not be popular. In temperate climates there are happily few opportunities for all the conditions favourable to dangerous hyperpyrexia to be fulfilled, and in the tropics gratuitous extreme exertion is always avoided. But I do not think the danger ought to be disregarded.

I well recall the cross-country race in the Olympic Games in Paris in 1924, held on a particularly trying day of humid heat. This race demanded an extreme exertion for approximately half an hour. Nearly all of the (very few) men who finished reached the Stadium in a state of alarming distress—collapsed, disorientated with loss of sphincter control—and I warned the authorities against holding the Marathon race if similar climatic conditions persisted.

It is interesting to record that the winner, that phenomenal Finnish runner, Nurmi, finished fresh and unperturbed, an example of the superior physiological adjustment in all its aspects which is doubtless the characteristic of the super-athlete.

The importance of sodium chloride—Pyrexia demands consideration from another aspect. The loss of water by perspiration during violent exercise is considerable and if the effort is protracted, as in a Marathon race, as much as 10 lb—the equivalent of a gallon of water—may be evaporated. I do not suppose that any serious consequences would result from temporary dehydration in a healthy subject, or that, by training, the human machine finds it difficult to tolerate such a degree of blood concentration, even during the maximum demands upon circulation and tissue exchanges. But the simultaneous loss of sodium chloride may be of more serious import. Sweat has a sodium chloride content of 0.3 to 0.5 per cent., so that on the basis of the degree of perspiration that has been noted, three-quarters of an ounce of salt might be lost. Since the total salt content of the blood is estimated at one ounce with tissue reserves of about double the quantity, a fairly severe interference with the body chemistry can be visualized.

It is known that restoration of water alone leads to a decrease in concentration of salt in the body fluids to a point when normal factors are impaired, and that ship's officers in the tropics have empirically recognized the etiology of abdominal cramps in stokers and the necessity to replace the salt lost concomitantly with the liquid. It is possible that minor symptoms occurring in athletes may be explainable on this principle, the disabling cramps of lawn tennis players may be recalled. And in general it would be far more profitable to think of the possible pathology of violent exercise in terms of biochemistry rather than to focus attention upon the idea of "heart strain."

PUBLIC HEALTH ASPECTS OF DISEASES PREVALENT IN WARMER WEATHER

By E H R SMITHARD, M.D., D.P.H.

Medical Officer of Health, Metropolitan Borough of Shoreditch

CORRESPONDING months in different years may show considerable variation in their mean temperatures. Variations may be even more marked in the hours of sunshine. But if these factors are averaged over a number of years a continuous rise and fall over the course of a year is seen in both the mean monthly temperature and in the hours of sunshine. The Director of the Meteorological Office has published figures which show that averaged over thirty-five consecutive years the daily mean temperature rises from about 39°F in January and February, to over 59°F in July and August. September (55.7°) is slightly less warm than June (56.6°). In the matter of sunshine the lowest months are November, December and January (all below two hours) and the highest are May, June and July (all above six hours), June itself having 6.63 hours. It will be appreciated that the "mean average temperature" over a month is not a very satisfactory way of assessing heat conditions, as a week's hot spell (which in certain circumstances may be a potent factor in the environmental cause of disease) may occur in the same month as a relatively cold spell, and so far as the mean average temperature is concerned would probably cancel out the hot spell. The highest temperature in a month is not a much better guide, as it may have occurred for one day only, but still it is one of the facets of meteorological truth and should be considered. For the three years 1936-7-8, the hottest days (80°F or over) occurred in June, July and August, whereas May touched 77° (80° in 1937), and September touched 78° (also 80° in 1937).

For ordinary consideration it may be assumed that on a broad average the first week in August is the hottest time of the year and the four months June, July, August and September make up the warmest third, July, August and September being the warmest quarter.

In trying to correlate the above data with the prevalence of disease the fact is apparent that, with the exception of notifiable infective diseases, little is recorded as to the exact time of onset of pathological conditions. On the other hand, disease mortality is completely recorded in relation to season (the day of death is a plain fact), but in most acute diseases there is a considerable lag—one week to one or two months—between onset and fatal termination. Mortality figures therefore are only an approximate indication of prevalence of disease at any particular time of the year.

MORTALITY IN THE WARM MONTHS

According to the Registrar-General's reviews for 1936, 1937 and 1938 (the last three available), certain but very few diseases do show greater mortality during

the warm months. Normally these months (June, July, August and September) have a much lower mortality than the rest of the year. For example, in 1937 approximately 136,000 persons died during this time, averaging 34,000 a month, whereas approximately 370,000 died in the other eight months, averaging 46,000 a month, or a 35 per cent increase. Diseases showing a larger mortality in June to September therefore may *prima facie* be considered to contain a factor correlated to the warmer part of the year. The only definite diseases which showed a larger mortality in all the three years under examination are as shown in table 1.

TABLE 1

Year (Oct -Sept)	Average deaths a month (nearest whole number)					
	1935/6		1936/7		1937/8	
Condition	July/Oct	Rest of year	July/Oct	Rest of year	July/Oct	Rest of year
Acute poliomyelitis	11	7	16	9	33	8
Malaria	2	1	2	1	3	2
Diarrhoea and enteritis	432	392	458	377	453	404
Food poisoning*	1	1	7	1	3	2
Accidental drowning*	92	40	106	44	88	38
Excessive heat*	6	0	5	0	4	0

The above table, except for the three conditions marked with a star, is based on the mortalities from July to October, i.e., a month later than the warmer months to allow for the lag between onset and death. This adjustment is not necessary in the case of the three starred conditions as a lag there is unlikely, because of the nature of the cause of death.

RISKS OF BATHING

Of the conditions set out *accidental drowning* need not be further mentioned except to say that it is only to be expected that it would take place during the warm holiday months. Further, it can only be construed as a disease if that word is used in its widest sense. Mention should, however, be made here of the public health aspect of bathing in swimming-baths. It has been alleged that all manner of diseases can be picked up in this way, from plantar warts to meningitis. This may just once in a while be true but in a well-conducted bath, with aeration and some form of chlorination of the water, the only trouble is likely to be the occasional lighting up of an old otitis media, not through infected water but by the simple hydrostatics of infective mucus being forced up the Eustachian tube.

MOSQUITOES

Malaria need only be briefly mentioned. The slightly increased mortality noted during the warmer weather of 1936/8 was not always present in previous years and therefore it was probably a coincidence, due to small numbers. Three conditions are necessary for the conveyance of malaria (Jameson and Parkinson, 1942) — (1) An anopheline mosquito must have bitten an infected person at least fifteen days previously (in England), (2) the person must have had in his blood sexual forms of the parasites, (3) the atmospheric temperature must have been favourable.

In England the likelihood of spread is not great, but it must be borne in mind that there will probably be a large increase in cases among men returning from overseas service. Eradication in this country is probably best arrived at by the early discovery and treatment of all cases and carriers. The main connexion of malaria with warm weather is of course through the mosquito, which does most of its breeding then. The important anopheline mosquito, *A. maculipennis* var. *atroparvus*, is rare in the British Isles. These and other mosquitoes and midges are a nuisance during warm weather and their bites may become septic. They are frequently in localized pockets near stagnant water, such as marsh land, but they rarely become a public health problem.

EXCESSIVE HEAT

Here again the mortality is negligible, being only about twenty to thirty cases in an ordinary year. In hot summers more die: thus in 1933 there were 123 deaths, in 1921, 243, and in 1911, 541. Morbidity is much higher if such things as feeling faint are included, but the feeling of faintness is rarely due to the heat of the day itself, there are usually additional factors, such as indigestion, overclothing, sudden exercise and so on. High atmospheric humidity is usually present and a wet bulb temperature of 83° F is regarded as the danger point for acute symptoms—temperature which rarely occurs in this country.

Working efficiency in certain trades is adversely affected by warm weather, even in this country. An example quoted in a Medical Research Council pamphlet on ventilation and other subjects,* is that of tinplate factories. A graph is given showing output varying almost exactly inversely with outside temperature, being lowest in August and highest in January. In the worst ventilated of these factories it is estimated that the output on the hottest days was 30 per cent less than in the coldest weather.

FOOD POISONING

Food poisoning would appear to be of little account so far as its mortality is concerned, only some 70 persons having died of it in the three years combined. This, however, is probably in part due to wrong certification, some deaths really due to food poisoning being ascribed to diarrhoea and enteritis. The incidence of food poisoning in the warmer months is relatively high and it is thought (Kinloch, Smith and Taylor, 1926) that the mortality rate is about 1.5 per cent, though this varies enormously from outbreak to outbreak. Thus, in a series of sixteen outbreaks due to milk and involving some 2,600 patients the case mortality was less than 0.2 per cent. On the other hand, in Aberdeen, in 1919, during an outbreak of gastro-enteritis due to infection of milk with a Flexner type of dysentery organism, there were over 1,000 cases with 72 deaths.

Of the four main groups of food poisoning, namely, bacterial, parasitic infections, chemical contamination, and "mistakes" (e.g., eating rhubarb leaves, or poisonous

* Pamphlet No. 1 on "Conditions for Industrial Health and Efficiency," issued by the Industrial Health Research Board of the Medical Research Council, 1944. H.M. Stationery Office.

fungi instead of mushrooms), only the first-named is of large-scale importance and is likely to be closely related to warm weather. Bacterial food poisoning is of two kinds (a) infection of the food with living bacilli, and (b) presence of preformed bacterial toxins in the food. Living bacilli which may infect food are nearly always of the *Salmonella* group and well over one hundred varieties of this group have been identified and typed, although for practical purposes in this country only about half a dozen are likely to be involved. Preformed toxins are usually either from staphylococcal infection of the food (and here especially milk products, such as cream or custard in pastries, are concerned), or they are the endotoxins of *Salmonella* organisms. These organisms multiply much more rapidly, if outside the human body, in warm weather than in cool and so it is not surprising that the incidence of food poisoning is greater in summer. In the Metropolitan Boroughs in the six years to 1939, 2,063 cases of food poisoning were notified, the average for the third quarter being twice the average of each other quarter.

The public health aspects of food poisoning consist mainly of a proper system of meat inspection, cleanliness in butchering, handling, storing and transport of food, supervision of the health of all food handlers, and supervision of food premises. The main authority for this work is derived from the Food and Drugs Act, 1938, with additional legislation as regards milk production. The wrapping of food, which was becoming well developed when war broke out, has undergone temporary eclipse. Proper cooking (called pasteurization when applied to milk) is one of the best safeguards.

DIARRHŒA AND ENTERITIS

A perusal of the Registrar-General's death statistics in recent years shows an increase, though not a large increase, in diarrhœa and enteritis during the warmer months (see table 1). This is in marked contradistinction to the position in the second and third decades of this century (table 2). Unfortunately the seasonal variations are not available for 1911 and 1912, but all reports agree that in the hot

TABLE 2

Year (1)	3rd Quarter		Average of 1st, 2nd and 4th quarters		Ratio of column 4 to column 5 (Col 5=100)
	Temp in °F from average (2)	General descrip- tion (3)	Deaths from D and E (4)	Deaths from D and E (5)	
1911	+ 5.2	Hot	46706*		—
1912	— 1.6	Cool	11555*		—
1921	+ 3.7	Hot	8537	2845	300
1922	— 2.4	Cold	1616	1893	85
1929	+ 3.5	Warm	2184	1503	145
1933	+ 5.0	Hot	1913	1236	155
1936	+ 1.4	Normal	1278	1240	103
1937	+ 2.7	Warm	1311	1203	109
1938	+ 0.9	Normal	1353	1150†	118

* These figures are the totals for the year and are inserted merely for comparison.

† Average of 1st and 2nd quarters only

summer of 1911 the great majority of deaths from diarrhœa and enteritis occurred in the hot months of July, August and September.

Epidemic diarrhœa in children—Summer diarrhœa in children is a disease which seems to have considerably lessened in incidence and almost to have disappeared so far as epidemic spread is concerned. But at one time it was prevalent. It had synonyms epidemic diarrhœa in children, infective or infectious diarrhœa; acute gastro-intestinal infection, acute ileo-colitis, cholera infantum—the multiplicity of names indicating both its malignity and its unknown etiology. Hutchison (1922) called it one of the chief scourges of infant life. It usually started epidemically in June, rose to a maximum in August, and fell towards the end of October.

Figures may be quoted to show the decline of diarrhœa and enteritis in recent years. In 1904, the mortality rate in children from this disease under two years of age per million living was 867, in 1913 it was still as high as 775, but by 1936 it had fallen to 122. All these years had average third quarters, 1936 being slightly the warmest. So far as infants under one year of age are concerned, epidemic enteritis and diarrhœa caused in 1914 over 17 deaths per 1,000 births. This was a year without a particularly warm summer. In 1938, a somewhat similar year, the figure had fallen to 5. The influence of hot summers is seen in the fact that in 1911 (a very hot summer) the rate was no less than 36 while in 1912 it was only 7.7. The rate for the whole of 1921 (another hot summer) was 14, and so was much less than that for 1911. Since then the rate has never exceeded 8, being around 6 in the warm summer years of 1932 and 1933 and dropping to a low record of 4.84 in the warm summer year of 1934.

Why has summer diarrhœa apparently disappeared in its epidemic form? The presumption is that the general increase in hygienic wrapping of food, supervision of food production, cleaner milk, frequent dust collection, better sewage disposal, even the more simple and cleanly fashions in clothing and furnishing, together with the great diminution in the fly population, have between them put up a sufficiently strong barrier between infective material and infants at risk.

But the bad days may return. There was a large increase in the number of flies in the summer of 1943, and dysentery and gastro-enteritis cases increased greatly in the autumn of 1943. The reason for the fly increase is not clear. It used to be thought that a mild winter would preserve them and that they would thus get away to a good start in the late spring. This theory is now rather discredited and it is thought that a mild winter kills more, by fungoid diseases and by using up their hibernating fat. The wasp is one of their chief enemies and the small number of wasps last summer may have allowed the large number of flies—which takes the argument one stage farther back. It seems certain, however, that whilst the fly can be influenced by cleanliness, the control is not absolute, and large fly populations may recur. If there is a hot summer this year and a large fly population, there might well be a gastro-intestinal epidemic because of the lessened hygienic environment due to war conditions. In this country, flies begin to multiply in June, increase in July, are most numerous in August and September, and gradually disappear during October and November.

A note on enteric fever—This, somewhat surprisingly, does not figure in the list of diseases with mortality rates higher in the warmer weather. Nor does its

notification rate show a close association with the summer or autumn months. It is true that, on the whole, the disease is more prevalent in the late summer and autumn, but the association is not sufficiently specific for detailed notice.

POLIOMYELITIS

For some years it has been noticed that notifications of poliomyelitis tend to be higher during the warmer months. Thus in 1921 poliomyelitis had a prevalence above the average every week from August 13 to November 26, in 1922 similarly from July 29 to November 18 (except for two weeks), in 1933 from July 22 to November 18, in 1936 from July 11 to October 24, in 1937 from July 24 to November 20, and in 1938 from July 23 to December 3. These are not selected years except in so far as they are the first six volumes of reports taken down from the bookshelf, a similar prevalence occurs in all other years intervening, except possibly 1928. Two points should be noted: first, that it is unlikely that such close parallelism throughout the years is due to chance, and secondly that the prevalence continues beyond the usual warm weather months into October and November. The mortality thereby is more scattered, but it will be noted from table 1 that the July–October mortality is definitely in excess of that for the rest of the year. What is the reason for this prevalence in the latter part of the year, and is it linked with warm weather?

There is no agreement as to the mode of infection in poliomyelitis, although it is generally thought that a vector is concerned, and there is a growing body of evidence tending to incriminate the fly. Keller (1942) put forward the interesting theme that obvious attacks of poliomyelitis are caused by a precipitating factor, such as measles, ear, nose and throat infection, or enteritis, which are thus “determinants” of an attack in a person already infected with the virus and who otherwise would have acquired immunity through a symptomless infection. Fanconi and Zellweger (1942) are of the view that the virus of poliomyelitis gains access to the body through the alimentary tract, the spread being analogous to that of the enteric and dysentery infections. In support of this view is the fact that the virus can frequently be cultured from the stools of patients but rarely from the nasal washings, and that the distribution of the disease is frequently in “pocket” epidemics as opposed to the more diffuse distribution from droplet spread. Further, the seasonal incidence is also that of the alimentary tract infections.

The sinister shadow of the housefly is heightened by the fact that on numerous occasions the virus of poliomyelitis has been recovered from flies caught where they were likely to be infected, such as near a brook draining sewage from a town where there were cases of the disease or from exposed human faeces in a rural area. A natural objection to the fly theory is that poliomyelitis is not less prevalent now than formerly, whereas the fly population (apart from exceptional years) is much less. An answer given to this objection is that the age incidence of the disease has also changed, older children and adults being now more frequently attacked than formerly. This results from the fewer opportunities for acquiring immunity to the disease in early life because of the improved alimentary hygiene of infants.

From the evidence it certainly seems plausible to regard the fly with grave

suspicion, either in the actual transfer of the virus or in producing another enteric infection, which in its turn precipitates an attack of poliomyelitis in a subject in whom otherwise it would not occur. The fact that the high incidence goes on into November does not rule out this disease as being especially associated with the warmer months, its complicated etiology and possible dependence on vectors being probably sufficient to cause the lag in the seasonal curve.

CERTAIN INSECTS

It is desirable that mention should be made of some other conditions which may have public health significance in relation to warmer weather. It has already been stated that most insects are more numerous in the warm part of the year. Those of possible public health significance include fleas, bugs, mosquitoes, midges, flies and (in the country) the harvest mite. Lice, on the other hand, because probably of more frequent washing, and changing of clothes, are not so prevalent in the summer as in the winter. Apart from the menacing fly, these insects, although unpleasant and sometimes causing septic complications from their bites, do not appear to be of much significance.

DUST AND POLLEN

There remains the question of dust. Much has been written, and proved, in recent years with regard to the pathogenic significance of dust, how virulent organisms may remain viable in it for weeks or months, and how it can cause cross-infection in wards. This present contribution, however, is on the public health aspects of warm weather. There is no greater amount of internally produced house dust, ward dust or mine dust in summer than in winter. On the contrary, so far as house dust or ward dust is concerned, the warm weather is associated with vastly increased ventilation. The dilution caused thereby more than counterbalances any small increase in the amount of dust getting into the air through the mechanical effects of the ventilation. Mine dust and general dusty occupations are probably not affected by season at all. Road dust, on the other hand, is more prevalent in warm weather because the weather is drier, or the dust dries more quickly. At the same time drying is bactericidal, and what is even more powerfully bactericidal is the sun. There is little or no evidence to show that road dust as normally encountered produces morbid conditions, except of course that in the summer it may contain pollen which may affect susceptible people. But the appalling increase in lung cancer in recent years is quite unexplained and therefore road dust, especially road dust with tar particles or combined with petrol fumes, cannot as yet be acquitted.

References

- Fanconi, G., and Zellweger, H. (1942) *Schweiz med Wschr* abstr. *Bull Hyg*, 1943, 18, 110.
 Hutchison, R. (1922) Price's "Practice of Medicine," 1st edition, London, 531.
 Jamieson, W., and Parkinson, G. (1942) "Synopsis of Hygiene," 7th edition, London, 125.
 Keller, W. (1942) *Münch med Wschr* abstr. *Bull Hyg*, 1943, 18, 20.
 Kinloch, J. P., Smith, J., and Taylor, J. S. (1926) *J Hyg*, 25, 434.

SKIN DISORDERS OF WARMER WEATHER

By JAMES SOMMERVILLE, M B, CH B

Lecturer in Diseases of the Skin, The Anderson College of Medicine, Extra-Mural Lecturer in Diseases of the Skin, University of Glasgow

THE approach to consideration of the subject of this article calls for a definite degree of classification. Warmer weather may be said to be warmer by virtue of increased sunshine, and because of stronger and increased sunlight two causal factors must be considered, i.e., light or ultra-violet rays, and heat or infra-red rays. The latter in turn will tend to aggravate working conditions where heat is already a factor. Furthermore, either directly or indirectly, warmer weather may imply increased humidity in working or leisure hours.

Warmer weather also brings with it possible seasonal alterations in diet and thus indirectly can be responsible for certain allergic responses by the skin. In addition, there are other disconnected factors due indirectly to warmer weather, such as school holidays, involving a diminution or complete loss of observation and control in certain diseases, and harvesting, responsible for increased exposure to unusual contacts.

With these factors in mind the following groups present themselves for consideration —

(A) *Skin disorders due to ultra-violet irradiation*

- (1) Erythema solare or sunburn—over-exposure to ultra-violet irradiation
- (2) Lentigo, ephelis or freckles—a pigmentary response to light rays
- (3) Xeroderma pigmentosum—reaction to light in a peculiarly sensitive subject.
- (4) Summer eruptions—including Hutchinson's summer prurigo and hydrotæstivale or vacciniforme, reactions in sensitive subjects possibly associated with unknown toxins
- (5) Pellagra—showing acquired light sensitivity
- (6) Lupus erythematosus—possibly acquired light sensitivity due to circulating toxins
- (7) Hirsuties—in certain young female subjects, often a late response to ultra-violet irradiation plus a seborrhœic tendency

(B) *Skin disorders due to heat rays and increased humidity*

- (1) Sudamina in infants, or prickly heat in workers
- (2) Dysidrosis, pompholyx or cheiropompholyx
- (3) Hyperidrosis
- (4) Epidermophytosis—including athlete's foot and Dhobie's itch

(C) *Skin diseases of altered social conditions brought about by summer vacations and holiday employment*

- (1) Tinea circinata
- (2) Tinea profunda and kerion
- (3) Tinea tonsurans
- (4) Scabies
- (5) Pediculosis

(D) *Skin diseases associated with warmth and seasonal diet*

- Urticaria—(a) acute
(b) papular.

It will therefore be the purpose of this article not so much to describe fully the conditions mentioned above, as to sketch quickly their salient features and to stress the treatment, with especial regard, when possible, to recent advances in tackling these problems

(A) SKIN DISORDERS DUE TO ULTRA-VIOLET IRRADIATION

(1) *Erythema solare* or sunburn is a condition of skin reaction, varying in degree from simple redness to severe blistering, occurring in parts over-exposed to bright sunlight, which is too common to require description. The condition is indeed so simple and common that it is frequently ignored, overlooked, and ill-treated until the damage done may be severe. This condition is an example of "an ounce of prevention being worth a pound of cure" with consequent saving of much discomfort. As soon as exposure has taken place or when redness is the only reaction, a simple calamine cream (see page 369) should be applied frequently. This is also of benefit when blistering has occurred, but if the latter be severe, then dressings of gauze thoroughly soaked in calamine liniment (see page 369) will give the greatest relief and should be continued until the skin dries, when calamine cream can be used.

(2) *Lentigo*, *ephelis* or *freckles*—again too common to warrant description. The occurrence in children rarely calls for attention, but when it occurs in fair or red-haired young women, the family practitioner may be called upon for advice. Here Punch's advice to those about to get married applies! Those who worry about freckles should not unduly expose themselves to strong sunlight and should use such simple precautions as an artificial tan and the protection of parasols and covered summer chairs or garden seats. Once freckling has occurred then peeling of the spots is the sole hope of removing them. This can be achieved by painting thrice daily with mercuric chloride, 3 grains to the ounce of glycerin or spirit, until a slight reaction develops, after which a simple emollient, such as lanolin, should be applied. The process should be repeated until the desired result is achieved.

(3) *Xeroderma pigmentosum*—This is a condition of permanent freckling, associated with skin atrophy, telangiectases, pigmented warts, and malignant change of the epitheliomatous type. The condition begins in childhood, and its course is variable. Some patients die within a few months, in some the condition remains stationary over a long period, and in others terminates fatally owing to malignant change. The minority of patients live to adult life, and these probably represent milder forms of the disease.

Treatment consists only of avoiding light exposure, and in those who reach adult life night-shift work or work in dark places suits them best.

Malignant change must be dealt with by surgery or diathermy as soon as it occurs.

(4) *Summer eruptions*—These varying degrees of light sensitization, occurring in summer and clearing or almost clearing in winter and appearing on exposed parts, especially the face, are generally only recognized when the recurrent nature of the condition becomes apparent. They begin in childhood.—(a) *Hutchinson's summer prurigo*—as discrete rounded papules, pale red in colour, and surmounted

possibly by a vesicle or rarely a pustule and, as the lesions itch, there may be blood crusts and wheals (b) *Hydroa æstivale*—with red spots on which one or more millet-seed sized vesicles appear or umbilicated vacciniiform lesions occur which crust and heal, leaving red and ultimately white depressed scars

Treatment of these conditions consists of prevention by protection, calamine cream or liniment according to severity, and if pustulation occurs a simple antiseptic salve, such as mercury, lead and zinc ointment (see page 369)

Internally, either nicotinic acid, 50 mgm thrice daily, or arsenical solution in small doses, beginning with 2½ minims thrice daily and gradually increasing the dose to tolerance limits and then decreasing, is of distinct help

(5) *Pellagra*—Although this deficiency disease with its triad of symptoms—diarrhoea, dementia and dermatitis (photosensitization type on exposed areas), and associated with its threefold dietary cause, namely, molasses, maize and salted meat, rarely occurs in this country, an odd case does crop up now and then The skin picture produced is striking and represents an acute sunburn reaction, most marked on the back of the hands and extending on to the wrists in a glove-like fashion, the skin in a well-marked case being reddish-brown in hue, rough, wrinkled and desquamating The affection is symmetrical

It is now known that the condition is an avitaminosis due to faulty diet or faulty utilization of food ingested in, for example, chronic alcoholics The deficiency is mainly in nicotinic acid, but riboflavin and B₁ may also be involved, and the replacement of these deficiencies is called for in treatment

(6) *Lupus erythematosus*—A condition of adult life and presenting a triad of signs, redness, scaling and scarring without ulceration It is essentially a toxic erythematous reaction occurring on exposed parts and is probably an acquired light sensitization due to the circulation of bacterial toxins The focus of these toxins is now recognized to be mainly focal sepsis in the upper respiratory tract or less often a tuberculous focus The eruption begins with one or more erythematous spots which spread outwards These are usually seen on the face, but many also occur on the scalp, the ears, sides of the neck and on the back of the proximal phalanges of the fingers

Scaling of a peculiar type develops on the erythematous base, a grey, mortary, stippled, fairly adherent scale, anchored firmly into the skin follicles When fully developed the patches spread over the bridge of the nose and the malar regions, giving the classical bat's wing or butterfly appearance As the process spreads and develops, scarring develops on the central areas, and in the case of the scalp this scarring leads to permanent baldness

Treatment of the condition is both local and general When the process is acute and active, mild sedative measures are called for, such as calamine lotion, cream or liniment, but when the disease has become stabilized, then more active measures can be adopted to hasten the scarring process Freezing with the solid CO₂ pencil or with a CO₂ snow and acetone slush, or painting with a paint compound of lactic acid three parts and carbolic acid one part, is equally useful in chronic patches Treatment on general lines, however, gives the best cosmetic result, and any focus of infection should be sought out and dealt with

In addition, injections of either bismuth or a bismuth salt or gold salts give

good results I prefer a bismuth salt, such as bisoxyl or bisglucol, and I usually give a course of twenty intramuscular injections over twenty weeks

Barber (1941) has shown, and I have confirmed his findings, that sulphanilamide internally can produce excellent results I usually employ proseptasine and give a half to one tablet four times a day for three days each week

(7) *Hirsuties*—I mention this subject because I am certain that exposure to strong sunlight is often a precipitating cause of this condition, which, when it occurs in young female subjects, occasions great mental distress The onset of coarse hair growth at the corner of the upper lips and on the chin can and does follow on sunbathing I have investigated the power of ultra-violet irradiation in stimulating hair growth artificially, and have noted marked increase in the lanugo hair growth on the back in cases of prolonged ultra-violet ray administration. This result is also borne out in the benefit of peeling doses of ultra-violet irradiation in alopecia totalis

The only safe treatment for *hirsuties* still lies in the removal of the hair growth gradually over a long period by electrolysis

(B) SKIN DISORDERS DUE TO HEAT RAYS AND INCREASED HUMIDITY

(1) *Sudamina* or sweat rash, *miliaria rubra* or prickly heat The former, with its outcrop of small, pin-head sized, clear vesicles at the mouths of the sweat glands, occurs most often in infants, but can be seen in older subjects either in the course of a febrile illness or after repeated sweatings in warm weather The latter occurs chiefly in adults and presents in the sweat-drenched areas an irritable redness made up of small red spots around the mouths of the sweat-gland follicles It occurs most frequently in the tropics, but is seen in this country in those who work in very hot atmospheres

Treatment is essentially one of hygiene and avoiding the cause, namely sweating Cool surroundings, cool clothing, tepid baths, dusting powder in children, and phenol, 1 per cent in calamine lotion, in adults, are all valuable

(2) *Dysidrosis*, *pompholyx* or *chieropompholyx*—This is a fairly common skin disorder of warmer weather and calls for but brief description It occurs mainly on the hands, and less commonly on both hands and feet It is a condition that is frequently recurrent and usually begins abruptly with a sensation of burning in the affected parts, sweating and the appearance of deep-seated, multilocular vesicles usually described as "sago grain" vesicles Not uncommonly it would seem to be an allergic response to an epidermophytosis of the feet, and the fungus has been removed from the roof of the vesicles More often than not it arises *de novo*, and I firmly believe that it can be a dermatitic reaction due to certain external irritants, not infrequently strong soap powders Unfortunately the condition often becomes secondarily infected and, in healing, not infrequently presents an exfoliating picture

Treatment in simple cases consists of eradicating an epidermophytosis if present, or avoiding soap and water, and local baths of a mild borax solution, or dressing with simple calamine liniment four-hourly in septic cases, sulphanilamide internally, if called for on general grounds, mild potassium permanganate baths, swabbing with mercuric chloride lotion 1:2000 and dressing with ichthyol calamine liniment to begin with and later with mercury, lead and zinc ointment

or ammoniated mercury 6 per cent in oxynitrate bismuth ointment 5 per cent

(3) *Hyperidrosis or excessive sweating*—This may occur as a general picture part of the specific fevers, but the condition to which it is desired to call particular attention is that form of excessive perspiration which occurs in the soles, palms and axillæ. It can be both distressing and objectionable, and can constitute an incapacity for work, as I have seen of late in optical precision workers. In the case of hyperidrosis of the feet, and occasionally of the hands, any associated condition, such as flat foot or ringworm infection, should first be dealt with. When the hands are mainly affected, occupational irritants and even soaps may be the continuing cause. These should be excluded, and sponging with borax or vinegar and water is helpful in all three sites. X-ray therapy with a full skin tolerance dosage, repeated if need be in four weeks and using preferably a high kilovoltage plant, generally succeeds.

(4) *Epidermophytosis*, including *athlete's foot* and *Dhobie's itch*—These conditions are included in this group because it is believed that both their acuteness and incidence are increased by warmth and moisture. It is no uncommon experience to hear that either of the two affections has arisen following the use of bathing ponds or pools. Both conditions are infections of the epidermis by a ringworm fungus and both exhibit the typical, well-defined edge of an infective process. Itch is well marked in both and can be intolerable. In the case of the foot the classical site is between the toes and along the plantar edge of the base of the toes. The condition is commonly confluent and presents, because of retained moisture in the parts, a picture of peeling, sodden skin, sometimes glazed, red, thin skin, with a peeling undermined edge, and frequently a foul odour. In the case of infection of the groins the colour is red to dull red, with an actively spreading vesiculo-scaly edge, the condition clearing somewhat in the centre, but in obese subjects or those prone to sweat, sweat retention may lead to maceration, and sometimes secondary infection, when the picture may be one of an infected dermatitis. This latter appearance now and again occurs in the feet, and I have seen such a case kept going and rendered worse by treating the primary cause instead of the secondary appearances.

Treatment of these two conditions depends on the clinical state at examination. If there be a superimposed dermatitis infectiosa this should be treated first with four-hourly dressings of gauze soaked in ichthyol calamine liniment. Then, when the dermatitic appearance has subsided or if the condition is a straightforward fungus infection, the following regime should be carried out. The affected area should be thoroughly cleaned night and morning with a bland oil, and this in turn completely wiped off with spirit. When dry, either of these ointments should be rubbed in, the latter only until a reaction has set in and this should be allowed to peel off. When the affected parts show clean and healthy skin and no active margins spread, the dusting powder should be applied daily for some considerable period after cleansing and drying.

R. Salicylic acid
Benzoic acid
Lanolin

℞ 3 to 5 per cent
q.s.

R Cignolin (Bayer)	}	$\frac{1}{2}$ per cent.
or		
Derobin (Glaxo)	}	3 per cent
Salicylic acid		
Lanolin		
R Salicylic acid		60 grains
Talcum powder		
Boracic acid powder	ss	1 ounce

(c) DISEASES OF ALTERED SOCIAL CONDITIONS, BROUGHT ABOUT BY
SUMMER VACATIONS AND HOLIDAY EMPLOYMENT

Warmth and increased humidity activate the growth of all fungi, and the absence of control and observation consequent upon school summer holidays, further diminished by the splitting up of these holidays, evacuation due to war exigencies, and harvesting in the interests of the war effort, have led to a distinct increase in the incidence of the ringworms, either superficial or deep, both of scalp and smooth skin. At any rate, in the west of Scotland during the past two years, whereas formerly there was quite a dearth of material for clinical teaching, there has been an abundance of cases of ringworm of all types

Tinea tonsurans, with its frosted scaling patches of broken, dull, lustreless hairs lying irregularly; *tinea circinata*, with its pale-pink to dull-red rings, spreading outwards and leaving in the centre those tell-tale, mildly inflamed follicles, *tinea profunda*, of animal origin, more acutely dermatitic, with bright-red, denuded, circular areas and undermined, superficially peeling edges, *kerion of the scalp*, with raised, boggy, suppurating nodules and pustular ringworm of the beard, with smaller, irregular, granulomatous, boggy lesions—all have been more evident in the past two years

Of ringworm of the scalp, it must be said at once that all suspects and their contacts should immediately be referred to a centre where the use of the diagnostic filter is available both for accurate diagnosis and follow-up observation reasons

The bulk of these cases come under the care of the education authority medical services. Treatment by epilation with X-rays offers the quickest cure and in competent hands the risk of permanent hair damage is slight. A few severe results following attempted epilation by the internal administration of thallium acetate, even in correct dosage, have led me to discard this method. Good results can still be achieved by topical applications, and I advise the shaving of the affected parts—the whole scalp if necessary—washing daily with soap and water and swabbing thereafter with a weak iodine solution and, after this has dried, firm inunction with Bencard's mycocten ointment in a special 10 per cent. strength which I have had prepared. The customary precautions with regard to carried fungus and the spread to others must of course be observed.

Tinea circinata is still dealt with by painting with tincture of iodine, or dressing with copper oleate ointment 20 per cent., or Whitfield's ointment. The same method will do for *tinea profunda*. Pustular ringworm of the scalp should be treated gently and almost invariably starch poultices suffice, as the suppuration process is nature's method of killing off the fungus.

In the case of the beard, starch poultices by night with ichthyol

liniment dressings by day and, internally, weak tincture of iodine, 5 minims three daily, have brought quick results

Scabies and *pediculosis capitis* both increase during school summer vacations, due to loss of educational authority medical supervision. Both are too well known to merit description here, but I would draw attention to the tell-tale follicular papules which appear around the umbilical areas in scabies, and the acute, almost flannel-like rash which occurs in infants, a picture that seems to be rather badly recognized by practitioners. The palms and soles in these cases will reveal typical scabies burrows. The use of benzyl benzoate emulsion in both conditions has been a big advance in treatment.

At the Southern General Hospital skin departments, 96 per cent cures have been obtained by the following method in scabies—

A good hot bath and scrubbing for twenty minutes is followed, after drying, by painting all over with benzyl benzoate emulsion. This is allowed to dry in and after ten minutes the integument is repainted and excess mopped off. The clothes are then put on again and twenty-four hours later a cleansing bath is given and the clothes sterilized. Follow-up treatment for post-scabetic pruritus is instituted by daily application of menthol $\frac{1}{4}$ per cent or phenol $\frac{1}{4}$ per cent in calamine cream. Failures are re-treated with benzyl benzoate as required.

The system has proved not only efficient but has saved time and costs.

Fully eighteen months ago I tried benzyl benzoate emulsion in a bad case of *pediculosis capitis*, by applying a soak to the scalp and keeping the soak on by means of a boudoir cap, for twenty-four hours. The results were dramatic and in bad cases this has since been my routine. The use of benzyl benzoate in *pediculosis capitis* has been recently advocated by Blackstock (1944) and his results published.

(D) SKIN DISEASES ASSOCIATED WITH WARMTH AND SEASONAL DIET

In this group something must be said about two conditions—(1) urticaria, acute and chronic in adults and (2) papular urticaria—heat spots, gum rash or “hives”. Both are associated with diet and are more common in summer, owing to the ingestion of certain articles of diet. Many food substances can give rise to urticarial reactions, but rhubarb and stone fruits I find to be common causes in the West of Scotland.

In adults, if the condition is acute, a good purge is often sufficient together with alkali baths and the use of phenol calamine lotion. In chronic cases the following advice is given about diet. Pickles, spices, sauces, mustard, pepper, coffee, and alcohol are all excluded. Tea is cut down to one cup night and morning, and all food should be allowed to cool down. In addition peas, beans, lentils, stone fruit, rhubarb, chocolate and cocoa beverages are excluded. Internally this mixture should be taken—

R. Tincture of aconite	30 minims
Sodium citrate	180 grains
Sodium sulphate	240 grains
Compound infusion of gentian	6 ounces
120 minims to be taken in water three times daily after meals	

If this fails, a complete blood picture is made and the system of "diet diary" installed

This diary system was first instituted by me many years ago, at the Royal Hospital for Sick Children's dispensary, for papular urticaria, when it was found that the diet group above mentioned included the most common cause of heat spots. The majority of children respond to this form of exclusion treatment, but when it fails the mother is asked to keep a faithful daily diary of all the child eats and drinks, together with the incidence of new heat spots. The diary reveals much, including irregular and gross over-feeding of children. After a few weeks, in difficult cases, it is possible to find the common offending article.

I have found during the above phase this powder or tablet to be helpful —

R Grey powder	1 grain
Acetylsalicylic acid	2 grains
Sodium bicarbonate	3 grains
$\frac{1}{2}$ to 1 tablet or powder twice or thrice daily, according to age	

These measures, which have almost invariably been successful at my dispensaries should, I hope, prove of assistance in dealing with this difficult condition.

APPENDIX

Calamine cream

R Prepared calamine	$\frac{1}{2}$ an ounce
Castor oil	
Zinc ointment	āā 3 ounces

This cream can be modified to include either menthol $\frac{1}{2}$ per cent, or phenol $\frac{1}{4}$ per cent, or solution of coal tar as desired.

Calamine liniment

R Prepared calamine	
Zinc oxide	āā $\frac{1}{4}$ an ounce
Olive oil	
Lime water	āā 4 ounces

This at present must be modified, in the absence of olive oil, and oil of rape or oil of arachis can be used, although they are not so good. This liniment can also contain ichthammol up to 2 per cent, and in sensitive cases the ratio of oil to water can be reduced.

Mercury, lead and zinc ointment

R Zinc ointment	
Dilute ointment of mercuric nitrate	
Glycerin of lead subacetate ointment	āā 1 ounce

References

- Barber, H. W. (1941) *Brit J Derm Syph*, 53,
Blackstock, Eric (1944) *Brit med J*, 1, 114

would give a beer of approximately 13 microgrammes per c cm. Complete extraction is unlikely, but it indicates the limiting of riboflavin content. Beer is also a good source of nicotinic acid (of the order of 15 microgrammes per c cm) and it is also reasonable to suppose that it contains appreciable amounts of nutrients, such as biotin, pantothenic acid, and inositol. During germination of the grain there is an appreciable destruction of phytic acid with a corresponding increase in the amount of inositol present. Drummond and Moran (1944) direct attention to these new aspects of the nutritional merits of that popular lunch "bread, cheese and beer." A tomato or, failing that, some watercress, would help to make this into a completely balanced meal.

VEGETABLES AND FRUIT

Salads—It has been stated that increased expenditure of energy demands more vitamin C. During war time it is necessary to depend on vegetables to supply this deficiency. The salads usually prepared in this country are made of lettuce, cucumber and beetroot, all low in vitamin C value. It is too little recognized that most vegetables can be eaten raw, although more people, feeling the need of vitamin C, are learning to eat raw vegetable salads. Salads made of shredded raw cabbage eaten alone or with grated onion to give flavour and grated carrot or swede to give colour, with sprigs of parsley and watercress, are not only refreshing during the course of the summer months but are good sources of vitamins A and C. Left-over cooked vegetables or cooked pulses can be added to a fresh salad. Radishes or tomatoes can be served either as salads or individual foods, these can be eaten at most meals, including breakfast. Potato salads, with grated onion and sprigs of parsley can be substituted for hot potatoes. Grated or chopped apples can be added to any salad. Diced swede, if juicy and tender, will make a good substitute for water melon, which it greatly resembles. Chilled and served with sugar it is a suitable dessert to serve with a hot meal.

TABLE 1

<i>Vitamin A</i>		<i>Vitamin C</i>	
	(International Units per 100 gm.)		(Mgm per 100 gm.)
Carrots	6,700	Parsley	150
Spinach	4,300	Brussels sprouts	100
Turnip tops	3,300	Turnip tops	100
Parsley	2,330	Spring greens	70
Lettuce	1,300	Cabbage	70
Spring greens	1,000	Cauliflower	70
Tomatoes	1,000	Spinach	65
Watercress	1,000	Watercress	60
Cabbage	300	Tomatoes	25
Brussels sprouts	130	Lettuce	25
Cauliflower	0	Carrots	4
		Rose hips	500-2,500
		Concentrated orange juice	220
		Black currants	160
		Black currant syrup	55

Fruit of all kinds, whether raw or stewed, is always popular, but unfortunately during war time, even in good seasons, the supply is limited. The addition of grated raw carrot or swede to any kind of stewed fruit will make it go much farther. The carrot, itself juicy, is little noticed if well mixed in with the stewed fruit, to which it gives an added flavour. Dried apple rings, apricots and prunes need not be cooked. If soaked in water for twenty-four to forty-eight hours they will be ready for consumption, and they also can be mixed with grated raw carrot, in which case the individual allocation will last much longer.

Vegetables and fruits vary considerably in their vitamin content. The following table shows the amount found in 100 gm (3·6 oz)—about an average serving—of the uncooked vegetables, and fruit juices

MEAT

Cold meat is often preferred in hot weather, especially by miners and others who work in a hot atmosphere. Night-workers often prefer cold meals. Many people, however, expect at least one hot meal a day, in which case a hot dish should be preceded by a cold soup or salad and followed by a cold sweet. Cold pie containing meat augmented by the addition of pulses and soya beans is usually a popular dish served with salad. Sausages are not greatly appreciated but for some reason are more likely to be eaten if made into rissoles, and served cold with salad.

FISH

Fish steamed and afterwards chilled, served with mayonnaise sauce, which can be made with dried egg, is a great favourite if combined with a brightly coloured salad, e.g., tomatoes, radishes, grated carrot or a sprinkling of paprika, of which there are plentiful supplies to be had at most large grocers. Savoury custard made with flaked fish, dried egg and household milk can be eaten hot or cold with hot vegetables or raw vegetable salad. Most fish are palatable if soured or cooked in vinegar. Tinned pilchards, salmon and sardines go well with salads.

CHEESE AND EGGS

Cheese can be served in many ways. In hot weather it is usually preferred in slab form or grated over salads or in a cold soup. Cheese custards served hot or cold are digestible and nourishing dishes. These should be made with household milk and dried eggs.

The increased ration of *dried egg* has been deservedly popular in most households and they are extremely useful, not only to housewives but to canteen caterers and those serving school meals. In hot weather an omelette or savoury scrambled dried egg preceded by or served with a salad are ideal dishes which are both light and nourishing. Dried eggs can also be hard boiled if reconstituted and poured into moulds and steamed, and afterwards eaten with salad.

SWEETS

Junkets are less often eaten during periods of milk shortage, although they can be made with household milk and eaten with or without fruit. Custard

dried eggs or custard powder mixtures sweetened, chilled and flavoured, are always popular. An excellent sweet can be made by stirring grated raw carrot into a custard mixture after it has been chilled. This is often mistaken for fruit. When gelatin is procurable the diet can be varied with jellies, which are always appreciated in hot weather, especially by children. The bottled, concentrated fruit juices can be used to flavour jellies which are made more nourishing by the addition of dried eggs or reconstituted household milk. Milk pudding made from household milk with the addition of a little margarine can be eaten hot or cold with or without stewed fruit. Fruit salads and fruit fool, or mousse, when fruit is obtainable, uncooked rolled oats or malted cereals, eaten with milk or sprinkled over fruit, make welcome variations to the diet in hot weather. Sultanas and chopped prunes can be incorporated with any sweet dish or salad.

SANDWICHES

Industrial workers and school children often like to take their meals out of doors in hot weather. Many varieties of sandwiches can be made for the snack meal, which will often contain greater nutritive value than a main meal. Sandwich spreads may consist of combinations of grated carrot and prune with grated cheese, cold meat, bacon or sausage with chopped radishes, sliced tomatoes, sprigs of parsley, grated onion or shredded cabbage. Dripping, with shredded cabbage, is good as a sandwich filling, especially if a scraping of marmite is added. Tinned pilchards, salmon and sardines make excellent sandwiches. Minced cooked fish, scrambled dried eggs combined with raw vegetables, peanut butter with sultanas or chopped prunes, sprigs of parsley spread over honey or jam, are only a few examples of sandwiches suitable in hot weather. A paste made of sieved cooked pulses and soya flour can be used as a foundation for any of the above mixtures.

INVALIDS

Most invalids require large amounts of fluids in hot weather, and those who have little appetite will often appreciate feeds of a fortified milk mixture instead of meals. Such a mixture can be made of liquid milk with the addition of dried milk and sugar, flavoured in various ways and served cold. Cold fruit drinks, or sieved or whole fruit, may be given between these feeds, which if served frequently during the day will supply a good amount of nourishment.

BASIC WAR-TIME DIET

The basic diet given in table 2, to which any other foods can be added to make up calories, shows how the rationed amounts of food with judicious planning of points will supply the protective needs of most individuals.

Reference

- Drummond, J. C., and Moran, T. (1944) *Nature*, **153**, 99.
Widdowson, E. M., and McCance, R. A. (1943) *Lancet*, **1**, 230.

THE SIGNIFICANCE OF MINOR HEAD INJURIES

By G C KNIGHT, MB, F.R.C.S

Surgeon, West End Hospital for Nervous Diseases, Assistant with charge of Neurosurgery, British Postgraduate Medical School, Neurological Surgeon, Emergency Medical Service

THE effects of injury to the head are modified by the normal mobility of the intracranial contents. Far from being rigidly encased, the brain is permitted a small degree of riding movement within the spaces of the subarachnoid system, which takes place chiefly in an antero-posterior direction, excessive lateral displacement of the hemispheres being restrained by the midline septum of the falx. Exaggeration of this normal movement within a fluid medium determines the nature of traumatic intracranial lesions. Displacement of the brain being a prime factor in the causation of injury, it follows that the effects of an injuring force will be modified not only by its magnitude but also by the direction or plane in which it operates. A comparatively trivial force suitably directed may occasionally produce most serious consequences, entirely out of proportion to the severity of the trauma.

SUBDURAL HÆMATOMA

Certain of the more serious complications of head injury are the result of rupture of the intracranial vessels, and it is a confusing fact that serious lesions of this type arise from minor rather than from major accidents. A blow on the front or back of the head that is sufficient to displace the brain may readily rupture one, or a bilateral pair, of the superior cerebral veins without inflicting any injury upon the brain itself. These veins cross the subdural space as they pass from the mobile hemispheres to become attached to the inner aspect of the dura, when they are torn, blood seeps down within the subdural space and produces a massive clot that spreads fore and aft over the surface of one or both hemispheres, extending laterally as far as the sylvian fissure.

It is important to emphasize the minor nature of the injury that may produce this serious complication. Numerous recorded examples illustrate this point, —a bump on the forehead, or a slap on the chin.

I have heard of an instance in which a fatal case followed a dental extraction, merely as the result of the head flying back at the moment of removal of an upper molar tooth.

The lesion may certainly follow a motor-car accident, in which the patient is pitched forward against the steering wheel without the head being actually struck. A minor injury which displaces the brain without producing any rise of intracranial pressure is the characteristic causative factor, for any more serious lesion attended by extravasation and swelling of the brain would automatically arrest this low pressure bleeding of venous origin. The cysts which are formed contain considerable volumes of blood-stained fluid, collections of 60 c.cm. or more on each side of the head are not uncommonly encountered at operation.

I have on one occasion removed as much as 164 c.cm. of blood from a unilateral collection in a patient who had been struck on the head by a falling hammer, following which complaint had been a slight headache of two days' duration and a gradually increasing weakness of the opposite arm.

causation In any large series of cases, however, it may be clearly seen that the manifestation of concussion, minor contusion and major contusion of the brain merge imperceptibly one into the other, and the reasonable assumption is that they are not distinctive mechanisms but minor and major expressions of the same process occurring with different degrees of severity In the process, which is common to all forms of brain injury, the nerve cells and their important connecting pathways undergo a temporary or more prolonged paralysis, owing to the sudden stretch and deformity to which they are subjected in the displacement of the brain at the moment of injury

The brain should not be visualized as a single homogeneous organ, it is in fact a composite organ consisting of major anatomical components which are linked together by relatively weak junctional tissues Thus the two cerebral hemispheres are connected with each other only by the commissures and the corpus callosum. Each hemisphere forms a separate component which is attached to the brain stem by a separate stalk, the crus cerebri When the brain is displaced as the result of injury, large anatomical units can move in relation to each other, or some to a greater degree than others, thus throwing stress and shear upon the junctional tissues The importance of this mechanism of internal derangement of the brain was emphasized by the recent experimental findings of Denny-Brown and Ritchie Russell (1941), who have shown that movement of the brain is essential for the production of unconsciousness

In their experiments, a pendulum of controlled speed and striking force was allowed to strike the head of an anesthetized animal If the head was free to move, consciousness was lost when a certain minimal acceleration was imparted to the head, but if the head was fixed and unable to move at the moment of impact, the skull might be fractured by the force of the blow and yet consciousness would not be lost

This finding, that a minimal acceleration or deceleration of the brain is essential to loss of consciousness, serves to explain certain of the puzzling features which may be present in minor wounds of the head Thus in *bomb injuries*, cases have occurred in which metal has penetrated into the head but its presence has never been suspected by those who had charge of the case, because consciousness had been preserved Small particles of metal moving at high velocity may fracture the skull and penetrate the brain without consciousness being in any way disturbed Preservation of consciousness must never be taken as evidence of the absence of injury to the brain, in the presence of a penetrating wound In all patients exposed to bombing even the most minor scalp wound must be carefully examined and the surface of the skull inspected

By way of illustration of the importance of this point, the following case recently operated upon at the British Postgraduate Medical School may be quoted.—

E M, a Yugoslav scientist, was injured by a bomb which burst within fifty yards of him He was not rendered unconscious—was perhaps a little dazed but walked to the nearest hospital, where extensive facial wounds were treated and a small scalp wound behind the left ear was sutured He was then treated for some nine months in a plastic unit where a brilliant result was achieved in restoring his facial disfigurement Eighteen months after the injury, he exhibited his first epileptic convulsion A premonitory aura of speech interference was experienced the patient knew what he wanted to say but could not find the words to express himself He lapsed suddenly into a generalized seizure Four convulsions of this nature had occurred, with gradually increasing frequency, in the

four months before I saw him. An X-ray examination revealed that a small portion of metal, together with chips of bone, were lodged in the region of the angular gyrus at a depth of 2 cm within the brain. Despite the involvement of the speech centres it appeared feasible to remove these. They were therefore extracted through a small osteoplastic flap, the scar in the brain was excised and a cellophane membrane inserted. Following this intervention there was an interesting disturbance of speech, the major defect being an alexia: the patient could speak almost perfectly, but when shown the word "Hitler" spelt out the name as "Daniel". This minor aphasia recovered completely in the course of the following two weeks and he is now able to write fully in foreign languages.

This case has been mentioned in order to emphasize the impossibility of judging the severity of injury to the brain in terms of loss of consciousness alone. Penetrating injuries may be sustained without any disturbance of consciousness.

In *closed injuries* of the brain, likewise, it is impossible to judge the severity of the neuronal lesion by the length of disturbance of consciousness. The most serious post-contusional symptoms may be encountered in patients who have sustained a relatively short period of unconsciousness. Post-traumatic headache and giddiness may be severe in a man who has been unconscious for a matter of minutes only.

If the belief is persisted in that concussion is something different from cerebral contusion, then these marked post-traumatic symptoms in a patient who has "only been concussed" would excite suspicion of malingering; but if the view is held, as it should be, that concussion is merely a minor clinical expression of diffuse brain injury, the severe persistent symptoms which are occasionally observed are more readily understandable.

THE POST-CONCUSSIONAL SYNDROME

The nature of the post-concussional syndrome is still a matter of controversy. Certain of the symptoms characterized by anxiety are undoubtedly psychogenically determined, but there are others which are just as obviously organic in origin. These organic symptoms consist of a diminution in intellectual power, together with loss of inhibition over the lower mental functions, so that primary emotions are exaggerated. When the picture in all its varied forms is dissected it is found that the *constant* features common to all consist of headache, giddiness, moderate impairment of the higher intellectual processes and defective control of the primary emotions. The headache is severe and stabbing in character, and is exaggerated by stooping. The giddiness has a peculiar quality and is a floating sense of instability, rather than a true vertigo. The emotional changes of organic origin are extremely characteristic, for the head-injured patient is readily moved to violent and hasty temper and will fly into a rage, in great contrast to the whining and peevishness so commonly observed in a true neurotic.

Superimposed upon this basic syndrome, which appears to have an organic basis, are different secondary neurotic symptoms, determined by social and environmental causes, such as anxiety states, palpitation, tremor and insomnia.

The *organic injury* can be explained as the result of the diffuse neuronal lesion inflicted at the moment of trauma. In the most serious cases of brain injury, those which are sufficient to kill the patient, histological study reveals evidence of this injury. Scattered diffusely throughout the brain, in areas remote from surface contusion, are zones in which the cortical nerve cells have atrophied and died. There are other zones within the white matter where axis cylinders have

ruptured and torn across. Attempted regeneration is observed where the fibres have only succeeded in producing end bulbs. Elsewhere minute punctate ring hæmorrhages are seen where blood vessels have been ruptured in the process of brain displacement, and have bled into the perivascular spaces surrounding them. Even the choroid plexuses may show evidence of the diffuse distortion, the cells of the plexuses becoming swollen and losing certain of their granules.

All these minute changes are an index of an acute instantaneous distortion of the brain occurring at the moment of injury, and it is readily understandable that distortion of neuronal tissue arising from this cause should at an interval after injury be expressed in loss of certain of the higher functions of the mind.

That certain of the post-contusional symptoms are organic in origin is evidenced by abnormalities observed in the electro-encephalogram. Patients who show a normal electro-encephalographic record are usually free from symptoms and unlikely to develop a post-contusional syndrome. In other patients, however, in whom the injury has appeared to be no more severe, marked abnormalities may be seen in the cortical rhythm. In these cases the patient may be symptom-free whilst he is at rest in bed in hospital, but will be extremely likely to break down and show symptoms when he attempts to return to the strain of his normal environment. This delayed breakdown in the presence of an abnormal electro-encephalogram is such a common feature that it may be said that even after a relatively minor head injury no patient is fit to take up his previous duties whilst the electro-encephalogram remains abnormal.

Giddiness, which is such a troublesome feature of the post-contusional syndrome, has recently been shown to result from the effects of contusion of the central connexions of the vestibular apparatus, usually affecting the centres of the side opposite to the site of impact of the blow, indicating that the brain stem has been affected by *contrecoup*. It is important that this mechanism should be fully appreciated, for giddiness may occasionally be severe in patients in whom unconsciousness has been of short duration, and the unwonted persistence of the symptom may arouse suspicion of malingering.

The cause of *post-traumatic headache* is not as yet fully understood. Certainly there is little evidence of any constant recurrent abnormality. Penfield (1936) has suggested that in the majority of cases the pain is attributable to the pull of light adhesions which form within the subdural and subarachnoid spaces, the blood vessels of the brain being pulled upon by movement of the brain accompanying alteration in posture of the head. The general consensus of opinion nowadays is that true organic pain of this nature is essentially rare, although it can occasionally occur. Occasionally the headache is the direct outcome of abnormalities of intracranial pressure following injury, especially a lowering of intracranial tension due to defective secretion of cerebrospinal fluid by the choroid plexuses. Low pressure syndromes of this type will obviously remove external support from the intracranial vessels, so that their walls will become unduly stretched by the normal blood pressure within them, and pain may be initiated by this cause.

When *post-traumatic headache* is persistent, however, it should always be investigated by lumbar puncture, searching for abnormalities in pressure. If the protein figure is found to be raised in the cerebrospinal fluid, the possibility of a

subdural hæmatoma as the cause of the headache may be considered. Occasionally, when the headache is localized, surface adhesions may be detected by X-rays, after the introduction of air, and divided with relief. As evidence of this type the following case may be quoted —

J. R., aged eighteen, was injured by a minute fragment of bomb which cut the skin in the left frontal region and merely grooved the outer table of the skull at this point without producing any depressed fracture or penetrating injury. The period of unconsciousness was momentary. The scalp wound was sutured and he made an uninterrupted recovery. Three weeks later, however, he began to complain of a severe, agonizing pain, localized to the region immediately subjacent to the scar, which was accentuated by coughing, sneezing, stooping or any other act that raised the intracranial pressure. His pain was so suggestive of an organic lesion that X-ray examination after the introduction of air was made. Immediate air encephalography revealed no abnormality, but plates taken twenty-four hours later showed a large lake of fluid—a filling defect caused by absorption of air at the cortical vessels were firmly bound to the inner surface of the dura by massive adhesions, and would therefore be pulled upon by every movement of the head. The vessels were set free from the dura and a sheet of cellophane inserted in order to prevent their becoming attached again. The relief of pain was immediate and the lad subsequently joined up in the R A F.

This case is of special interest as it indicates that well-marked focal contusion of the brain can occasionally occur in a closed injury without prolonged unconsciousness.

POST-TRAUMATIC EPILEPSY

Epilepsy beginning after an injury to the head is seldom truly traumatic in origin, except in the case of severe injuries in which the dura has been penetrated. The incidence of epilepsy after penetrating injury is 25 per cent. the incidence of true traumatic epilepsy in closed injury is 0.1 per cent. The difference in incidence is attributable to the in-growth of fibroblasts from the surface which occurs when the dura has been opened, and which is likely to produce a contracting scar that will pull upon the brain.

Thus when epilepsy follows a closed injury, careful consideration must be given to the alternative diagnosis that the injury has merely precipitated the onset of idiopathic seizures. This is by no means uncommon, and the distinction cannot be determined on clinical grounds alone. The character of the fit certainly does not serve to differentiate between the true traumatic epilepsy and an idiopathic seizure, for a focal epilepsy is not always Jacksonian in character. When focal epilepsy arises from a lesion situated at a distance from the motor cortex, the convulsion will be generalized, and in the case of focal lesions situated in the frontal region the fit is exactly like that of an idiopathic seizure. In many cases the distinction can only be achieved by means of an electro-encephalogram. This will reveal, in the case of idiopathic epilepsy, a characteristic bilateral discharge arising from foci in both frontal regions. In true traumatic epilepsy the rhythm is commonly normal between seizures, although abnormalities derived from the region of the focus may be excited by h—

SOME PROBLEMS OF BREAST-FEEDING

By F CHARLOTTE NAISH, M B, CH B

THE care of an infant is so much a matter of detail that it is bound to remain largely the affair of the general practitioner and midwife, or their equivalents, in the coming medical hierarchy. However skilled and careful a paediatrician, his instructions at a single consultation are bound to be sketchy and to leave gaps which can be well filled only when the general practitioner has a sound basic knowledge. Much, too, of an infant's deviation from the optimum occurs insidiously, and may be overlooked temporarily or permanently, so that without a discriminative eye in close attendance, handicaps to health may reach the paediatrician either too late or not at all.

In a subject of this kind careful observations are the keynote of success. The "old wives' tales" of the experienced midwife and grandmother are often derided, but it is a fact that they often succeed where expert knowledge fails. On the other hand, there are often banded against the general practitioner vast numbers of uneducated persons who "voice" themselves in opposition. At present, when it comes to a "battle," they always win. If a grandmother wants the baby weaned she can generally manage it, for the simple reason that she is more constantly present, and her propaganda has the weight of constant repetition. If, however, the general practitioner were armed with more effective weapons of argument, proofs of success, and a more confident attitude towards his own knowledge, he might not always be the vanquished. These personal observations undertaken in general practice on breast-feeding may therefore be found of value.

THE ARGUMENT FOR BREAST-FEEDING

Are practitioners, as a corporate body, thoroughly convinced that breast-feeding offers definite and unmistakable advantages over any form of artificial feeding? It is necessary to keep an open and critical attitude of mind and be prepared to assess each case afresh. Many arguments have been used in favour of breast-feeding, most of which are familiar, and these therefore will not be touched on. One point which has particular appeal — The first six months is the period of extra-uterine life during which by far the greatest amount of new bodily tissue is being laid down. If the optimum is not attained at the end of this period it is doubtful how far compensation can take place at a later period. The particular milk hammered out by survival value during the long stages of evolution will according to expectation contain the best combination and proportion of amino-acids, fatty acids and carbohydrates in the most assimilable form.

So-called "humanized milk" is pleasing to the imagination, but in reality it can claim only a distant cousinship to the real article. Is it justifiable to approve a second best lightly when not in a position to estimate the extent of harm that may accrue in an uncontrolled experiment? Everyone knows that some breast-fed babies do poorly and some artificially fed do well. The critical faculty should make a facile judgement based on such face value, and an effort should be made to probe more deeply the cause of such failure and success.

THE MANAGEMENT OF BREAST-FEEDING

During the first week, careful management is most important. The baby should be put to the breast every six hours until milk is obtained. It is necessary to see that the baby gets hold with its jaws of the breast tissue beneath the areola, and not just the nipple itself. The correct position is one in which the baby is biting upon the breast behind the nipple, the nipple itself being drawn right back to the level of the fauces. Once the baby has the right hold it should only be held there for one minute, as excessive sucking at this stage leads to sore nipples.

I was asked recently by the medical officer of a maternity hospital how she should treat an almost universal condition of sore nipples. It appears the babies were sucking for 10 to 15 minutes from the first day. I implored her to alter that *only* and nothing else. The result was a complete disappearance of the condition in the early days.

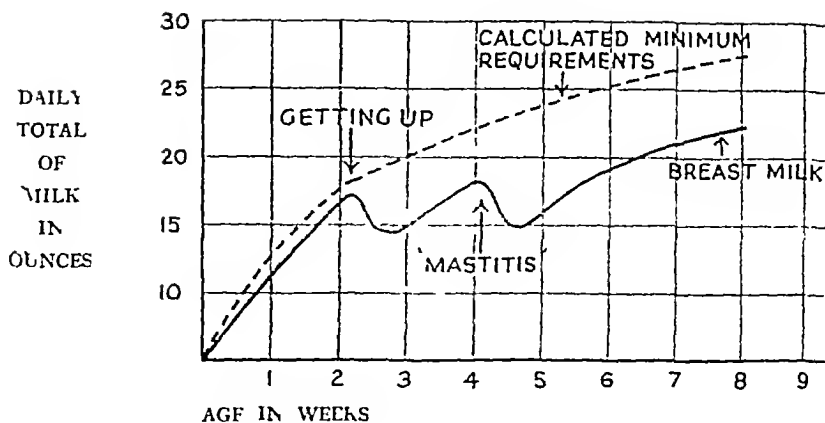
Sometimes the baby will behave correctly with one breast and refuse the other. This may develop at any stage of breast-feeding and is hard to explain, but it must be due to some discomfort of position. For instance, should the baby refuse the right breast, he can be persuaded to feed at the right breast by holding him with his legs under the mother's right arm, thus presenting the nipple on the right side of his face as at the left breast. If the baby is premature or very small, or if the milk is slow in appearing, it is wisest to give some nourishment. This is best supplied by glucose and water, or dilute cow's milk feeds with glucose, such as half milk and half water with 1 teaspoonful of sugar for each 2 ounces of mixture, 1-ounce feeds are quite sufficient. The food should be given with a spoon. In normal-sized babies born at full term, the period of starvation does no harm, but water can be given in small quantities with a spoon.

A word may be said here upon the question of the *timing of the feeds*. For the last twenty years there has been a tendency to have a rule of four-hourly feedings. This is much overdone, and I am constantly getting babies brought to me at a few weeks old who are starving, owing to the rigid application of this rule. Some babies will go four hours between feeds from the start—large babies with multiparous mothers—but all first babies under 8 lb. and all babies under 7 lb. should begin on three-hourly feeds, with longer intervals at night, totalling altogether six feeds a day. In small, premature babies, two-hourly feeds with a total of eight per day is not too frequent. In this case the breast milk can be given at each feed, or at every other feed if the mother feels exhausted, or the supply is not sufficient.

TEST FEEDING—A more common use of test feeding should be made during the first few weeks of life. It has a twofold advantage. It comforts and cheers the mother whose milk is adequate, and it quickly detects an inadequate supply. Frequently the timely addition of complementary feeding at this stage will result in a greater quantity of breast milk being secreted. *Complementary feeding* is the addition of an artificial mixture to each or several breast feeds, whereas *supplementary feeding* is the replacement of the whole feed by an artificial mixture. It is well, also, to experiment with the timing to discover if the day total is larger on three- or four-hourly feeds. Both breasts should be used at each feed. A common practice of midwives is to feed the baby at both breasts four-hourly, but at alternate breasts three-hourly. This defeats its purpose, as the day total is not increased by this method. The only occ

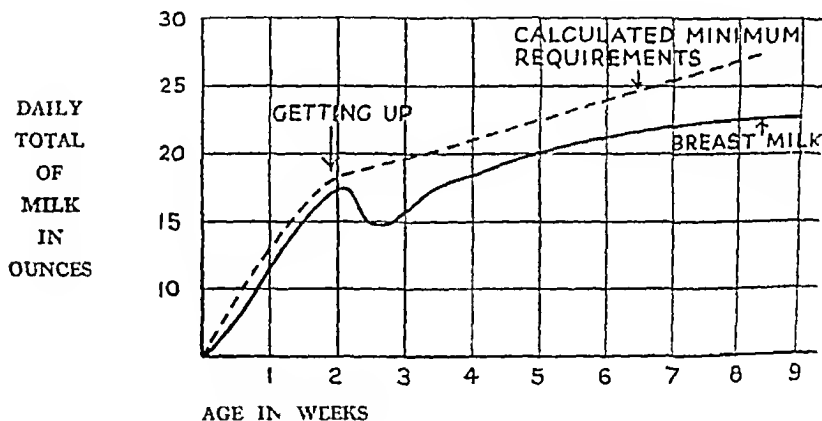
fied is when

CHART 1



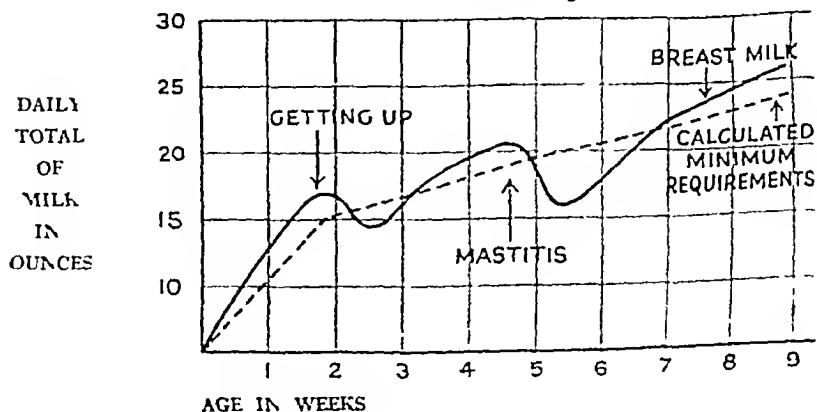
Birth-weight 7 lb Weaned at 6 months "Complement" given

CHART 2



Birth-weight 7 lb 2 oz Weaned at 6 months "Complement" given.

CHART 3



Birth-weight 6 lb 3 oz Weaned at 9 months

The tense congested breast—This is a remarkable condition met with quite commonly and often completely misinterpreted with disastrous results to the success of lactation. The breast appears engorged, with many large veins running over the surface, it feels hot to the examining hand, firm and full of small areas which are intensely hard. It has every appearance of a liberal secretion and, without the aid of a test feed, it may be thought that the baby is getting a good supply. The test feed, however, reveals the fact that the baby is getting nothing. Treatment is hand massage and expression of the milk before each feed, so that the taut breast is softened and the baby allowed to get its proper grip and stimulate the milk flow. If this is not possible it is best to keep the baby off the breast for two to three feeds, as ineffective sucking will only lead to sore nipples. Careful massage of the periphery of the breast for fifteen to twenty minutes will reduce congestion and produce a full flow of milk and a satisfactory establishment of routine feeding.

The prevention of congestion of the breast depends, I think, upon three things: the clearing of the ducts antenatally and frequent effective suckling by the baby in the early days of lactation. H. K. Waller in his book "*Clinical Studies in Lactation*," has employed the hand expression of colostrum during the later months of pregnancy, and from my experience I support his suggestion. The third factor is the adequate support of the breast. There is a great tendency in institutions to bind the breast tightly to the chest wall, with flat binders. Upward support with a well-fitting "Kestos" brassiere will ensure a good circulation in a pendulous breast. In spite of these methods, however, cases still occur and I think the condition is one of circulatory congestion caused by the onset of lactation, which causes pressure upon the milk glands and prevents enough milk collecting. The blockage of the ducts is therefore merely a contributory factor, which by damming back the little milk present aggravates the tension within the breast and tends to suppress the milk still further.

(2) *Chronic inadequacy*—It is probable that this type of chronic inadequacy is occurring with greater frequency. As a matter of general observation I think it occurs more frequently in those mothers who have other work to do of a mental nature. It may be that a highly active mind inhibits the action of the hormones which activate the secretive glands during pregnancy. If so, the only possible treatment would seem to be to encourage such women to "lie fallow" more during pregnancy. I have not sufficient cases to support this theory and I put it forward as a suggestion only. In such cases I advise constant and frequent test feeding, and the addition of complementary feeds up to or beyond the calculated requirements. Charts 1 and 2 represent two successive lactation periods in the same woman. Test feeding was carried out throughout and the complement added as shown. There is a similarity of design which I find rather usual in the various lactation charts of the same mother. It is better to do a test feeding throughout the day once a week than at one feed through the week. The method is easy. If the general practitioner has a good pair of scales, he can lend them out as necessary, or ask the patient to hire from one of the reputable firms. The best type of scale is a pan balance with metal or enamel pan. Spring balances are useless, and basket containers alter in weight with wear and age. The mother quickly learns to use

THE INTERPRETATION OF PHYSICAL SIGNS

VI—IN GYNÆCOLOGY

By V B GREEN-ARMYTAGE, M D, F R C P, F R C O G

Consulting Gynæcologist, West London Hospital, Visiting Gynæcologist, British Postgraduate Hospital and Basingstoke Hospital

IN gynæcology, bimanual and recto-vaginal examination will enable a diagnosis to be made in nine out of ten cases, but accurate interpretation of signs, whilst depending upon an empty bladder and rectum, is rendered most certain if the patient is upon her back rather than on her side and the examining hand is between rather than under the thighs

For instance, take the problem of sterility. The physical signs, often so blatant, are frequently misunderstood because the practitioner little appreciates the significance of loin obesity, male distribution of pubic hair, a narrowed introitus, a tented vagina, a conical button cervix, a short posterior vaginal wall or a small acutely flexed uterus readily felt through a feeble-toned pelvic floor. One or more such signs accompanied by dysmenorrhœa or periods that have begun late and function irregularly are constant features of hypoplasia, a state responsible for 40 per cent of all cases of feminine sterility

HYPOPLASIA OF THE GENITALIA

In the past, many of these cases have been dealt with by dilatation and insufflation, a somewhat unsatisfactory method of treatment, in that there is often spasm of the tubes and hence a tendency to make a faulty diagnosis of tubal occlusion. Therefore it is probably better to do a hystero-salpingogram which shows not only the exact size of the uterus but demonstrates the patency or non-patency of tenuous tubes—not that of course the size of either of these is the cause of the sterility, for they are but physical signs denoting immature ova and ovaries, the result of pituitary dysfunction

The question is often asked “what is the cause of this common condition called hypoplasia or immaturity of the genitalia that is so difficult to treat?” Some, on the hypothesis that the vitamins are to the endocrines what the endocrines are to the economy, consider that it begins *in utero* and continues throughout the first and second dentitions until puberty. Others think it is related to the present-day malpractice of contraception during the early months and years of matrimony, whereby the uterus fails to grow, and is thus immunized by fractional doses against growth, in that it is deprived of certain biochemical stimuli which it should normally obtain in full quantum from the male secretion

In the course of everyday investigations it is not at all uncommon to find spasmodic occlusion of the tubes to CO₂ or air. The advantages of iodized oil are therefore outstanding, for even should the cornua occasionally show a prick-eared appearance denoting acute spasm, the prognosis is excellent. Fig 1 demonstrates such a case in which the patient, negative at 250 mm Hg to air, became pregnant the month following this lipiodologram. On the other hand should the

cornua appear rounded (fig 2) then the prognosis is bad, for the occlusion is organic. Such a sign, however, does not necessarily mean that the total length of the tube is occluded for, provided there is no history of gonorrhoea but rather one of artificial abortion, it is quite usual at laparotomy to discover that the distal

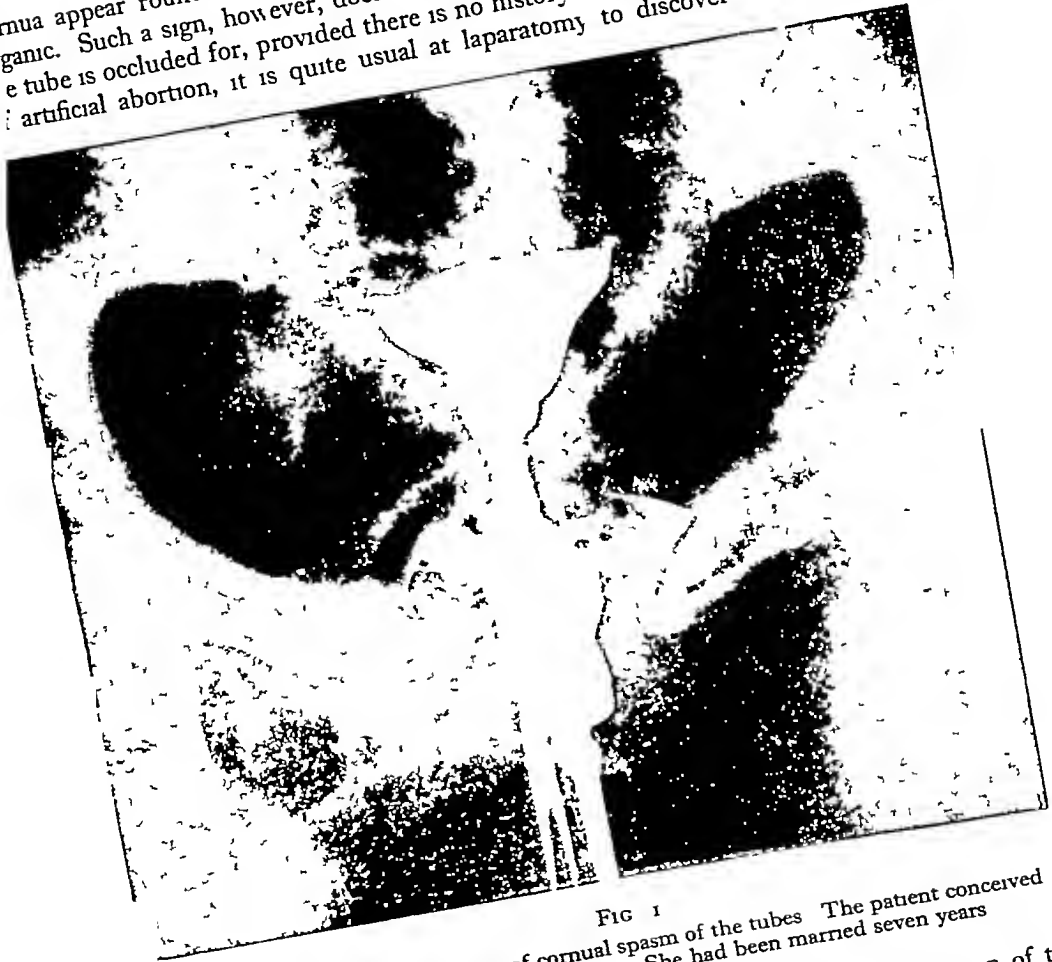


FIG 1
Showing prick-eared appearance of cornual spasm of the tubes. The patient conceived within six weeks of the lipiodologram. She had been married seven years.

portions of the tube are normally patent, a finding that permits excision of the blocked part and tubo-uterine implantation of the healthy portion.

Finally, it must not be forgotten that whereas 25 per cent of patients become pregnant after one or more successful insufflations, at least 40 per cent conceive shortly after a lipiodologram. Some consider this is due to the tonic effect of the 40 per cent iodine, others that the oil acts bacteriostatically; whilst still more think that it dissolves obstructions.

ABDOMINAL PAIN

It is not uncommon to be called by an anxious parent or school matron to see a young girl with a history of sudden abdominal pain, vomiting and tenderness

painful, vaginally feels as if the cervix were set in plaster of Paris. This condition in 80 per cent of cases is due to streptococcal cellulitis subsequent to instrumental interference and laceration of the cervix or lower uterine segment. This phlegmon takes months to resolve but causes no great invalidism, as it is retroperitoneal. Only a small percentage break down into abscess formation, and though eventual healing with fibrous scarring may give rise to deformity and deviation of pelvic viscera, sterility from tubal occlusion is rare.

Self-induced attempts at abortion are not uncommon. The patient when seen may have no discharge and no local signs of inflammation beyond an acutely tender enlarged uterus, but the almost certain presence of a pelvic exudate giving rise to extreme tenderness in the pouch of Douglas makes a diagnosis probable. The early use of morphine, sulphonamides, warmth and Fowler's position will materially lessen the chances of surgical interference.

Peritonitis —To-day, apart from fulminating appendicitis, it is not usual to see cases of general peritonitis except they be due to a ruptured pyosalpinx, criminal abortion or Welchii infection. Curiously enough such serious cases are not always diagnosed with ease for, although the abdomen is distended and maybe the skin is tender, there is often no rigidity. Moreover, the patient herself with her flushed cheek, bright eye, clean tongue and alert mind may beguile those in attendance. But the practitioner must be on his guard for, whatever the temperature, the almost hourly rise in the pulse rate together with the death-like silence of paralytic ileus on abdominal auscultation will proclaim a dire prognosis.

Welchii infections, though rare, have only to be seen to be for ever remembered. The history is usually that of artificial abortion, or death of the fœtus and craniotomy. The very rapid pulse, the tense tender abdomen, the stinking frothy vaginal discharge, the early jaundice associated with mottled cyanosis, the diarrhoea and maybe vomiting, the port-wine urine and port-wine serum, present a clinical picture urgently demanding sulphonamides and massive serum treatment if recovery is to occur.

EXTRA-UTERINE GESTATION

The early features of extra-uterine gestation, such as the missing of a period or the evidence of spasmodic colicky pain with a prune-juice discharge, are often not appreciated until there is sudden agonizing pain and collapse. Slight distension and shifting dullness may indicate free blood in the peritoneal cavity, but most typical of all early signs are the hourly rise in pulse rate, the subnormal temperature, dropping blood pressure and the presence of suprascapular shoulder pain, which, if not at first complained of, may be obtained by raising the foot of the bed, thus allowing free blood to infiltrate between the liver or spleen and the diaphragm.

Most often the practitioner will not be called in until all acute symptoms have passed and the patient has but lower abdominal tenderness. In such a case resistance or a doughy swelling in the pouch of Douglas or in one postero-lateral quadrant of the pelvis will be felt. Should doubt still exist, what is more easy and safe than to place the patient in the lithotomy or Sims' position and plunge the

needle of a 10 c.cm. record syringe into the pouch of Douglas? If dark liquid blood is withdrawn, diagnosis is certain, unless of course it be that very rare condition, hæmatoma ovarii. A Zondek Aschheim test is not of great value, for it may remain positive two weeks after death of the ovum, on the other hand it may be entirely negative.

The question of immediate operation always arises in such cases. If intra-peritoneal hæmorrhage is persisting and the pulse is rising then it is a necessity to get in and get out quickly, giving in the absence of a donor the patient's own blood from the peritoneal cavity as an intravenous injection. Many times I have had to do this, cupping the fluid blood out of the belly and then filtering it through twelve layers of gauze into a jug containing 2 ounces of sodium citrate solution standing in a warm container. Serious reactions to this life-saving procedure are rare. On the other hand, if when seen the pain has ceased, the patient is comfortable, and there is a story of a cast being passed or a cast is actually to be seen, then all immediate danger has passed, for the fœtus is dead and tubal bleeding has stopped. In such a case the patient can be given morphine, and glucose saline, and in due course removed to a nursing home or hospital for operation.

ENDOMETRIOMAS

Although endometriomas are responsible for some 15 per cent. of all gynaecological pathology, the cyclical signs and manifestations of their presence are not always recognized. Of course the non-encapsuled *adenomyoma*, simulating a fibroid of the uterus, is as a rule undifferentiable, but severe dysmenorrhœa and hæmorrhage in a patient with a tumour hardly bigger than an orange should give rise to suspicion.

The clinical types which cause most error are either the tubo-ovarian masses on either side of the uterus, which simulate those of gonorrhœa and tuberculosis, or the recto-vaginal adenomyoma which presents as a hard nodular mass at the top of the vagina, equally easily felt per rectum, simulating carcinoma. A careful history, the age and general health of the patient, together with absence of fever, leucocytosis, or blood from the rectum will help. As a rule severe dysmenorrhœa, dyspareunia and menorrhagia, coming on in the late thirties or early forties associated with hard, or maybe tender, nodules, easily felt in the pouch of Douglas, will prevent errors in judgement. Rarely, endometriomas invade the utero-vesical pouch causing hæmaturia, or they may be found in the scar of a previous abdominal operation, e.g. Cæsarean section or myomectomy, where endometrial cells have been implanted and grown. The most common feature of such tumours is the cyclical display of signs and symptoms, dependent upon the reaction of the selective but implanted cells of the endometrium to the anterior pituitary.

This is not the place to dilate upon the signs of carcinoma of the cervix, for it is universally recognized that the crumbling bleeding surface of cancer is different from the smooth, though maybe nodular sensation of an erosion with *ovula Nabothi*. Occasionally that rare condition of soft painless tuberculous ulcers of the cervix will present itself and will have to be differentiated from the wash-leather painful syphilitic chancre with its indurated edges.

probable that the much more frequent incidence of trichomonas infection to-day is due to the fact that in many cases a contraceptive rubber cap or possibly an intravaginal insertion is moistened by the patient's tongue beforehand, in order to facilitate introduction. In the absence of a microscope, the mousey smell, the presence of a greyish discharge, the beaded bubbles winking at the rim of the speculum, all help in the diagnosis, but perhaps the most conclusive feature of all is the intense alkalinity of the discharge when tested by nitrazine paper.

In other cases of leucorrhœa the discharge is creamy and there are no bubbles. The pH is acid and the soreness seems to extend from the vulva to the thigh, in these if the threshold for sugar is low, or should there be lacto- or glycosuria, monilia are the cause.

The soreness and itching may, however, not be accompanied by any discharge, the appearance being dry, greyish or bluey white with small smooth red areas, denuded of squamous epithelium. This condition, unlike kraurosis vulvæ, is *leucoplakic vulvitis*, which in its later stages may go on to epithelioma. These two can best be differentiated by the fact that whereas in leucoplakia the vestibule and urethra are never involved and the perineum and labial folds look like parchment with red-lined cracks in it, in kraurosis the vestibule and urethra are always contracted and the vaginal orifice, yellowish-red in colour, is exquisitely tender. Moreover, in this latter condition the atrophic changes do not extend to the perineal area.

It would, however, be unwise to label every case of pain and pruritus vulvæ as leucoplakia, for the practitioner frequently may see a case of lichen in which from constant scratching the vulval surface is dry, swollen and indurated, resembling pigskin, the colour being red, grey or white, dependent upon the degree of keratosis. Oftentimes this condition is accompanied by eczema and there may be crusts and serum oozing from a sodden swollen surface. Such cases are not leucoplakic vulvitis and should never be treated with œstrogens. They react far better to simple dermatological methods, ionization and/or Grenz rays.

Intertrigo is not likely to be a stumbling-block for it is most often seen in the fat and greasy skinned patient, extending from the vulva to the groins, but the thickening of the skin may give a superficial resemblance to leucoplakia, unless it is remembered that fungi, such as *oidium albicans*, are often easily demonstrated by examining scrapings with a one-sixth lens after soaking in solution of potash.

Finally, when asked to express an opinion upon *pruritus* in this area it is well to keep in mind not only *inea cruris*, a condition which is due to an epidermophyton akin to that found so often between the toes, but also that not uncommon complaint seborrhœic dermatitis due to the bottle bacillus, an infection often accompanied by eczematous crusts and fissures which contain streptococci. There are rarer conditions, such as psoriasis and herpes, but the important thing is not to mistake leucoplakic vulvitis for any of the above, which are as a rule treated on entirely different lines.

NOTES AND QUERIES

KETOSIS AND CALCIUM

QUESTION—A practitioner from the West of England writes—In the last few months I seem to have seen more children than usual with recurrent vomiting attacks, associated with a marked odour of ketone bodies in the breath. On consulting various books and articles it rather seems to me as if our rich West-of-England milk may have something to do with this, as many of the children have been evacuated here. But, if I am to eliminate all or nearly all the milk from their dietary, which is recommended, how am I to see that they get sufficient calcium?

REPLY—Recurrent vomiting attacks in children together with an odour of ketone bodies in the breath are not uncommonly associated with an intolerance of milk fat, and this is particularly likely when the milk supply is a rich one. The intolerance is to milk fat, not to the whole of the milk, and the prevention of such attacks lies first in reducing the fat content of the milk by skimming. The total daily intake of skimmed milk should be from $\frac{1}{2}$ to 1 pint. The calcium in milk is not removed by skimming, for the calcium and other salts are in solution in the watery part of the milk, and to give the amount of skimmed milk recommended above will supply an adequate intake of calcium. If milk is given in this form instead of being entirely withheld, there is no need to reinforce the diet with calcium. It must be remembered that the vitamin D of milk, being fat-soluble, is largely removed by skimming, and unless there is an adequacy of this vitamin in the diet the calcium in the food will be but poorly absorbed. Therefore when feeding skimmed milk, the supply of vitamin D must be safeguarded by giving one of the concentrates, and also seeing that the child gets out of doors as much as possible. Other foods rich in calcium, particularly cabbage and 'greens,' have no adverse effect upon ketonæmic vomiting and therefore may be encouraged in the diet.

WILFRID SHELTON, M.D. F.R.C.P.

DAMPNESS AND RHEUMATISM

QUESTION—A practitioner writes—Can you get me some accurate information about the relation of dampness to rheumatism. I believe I am right in saying that in the damp conditions of trench warfare in the 1914-18 war there was no rheumatism among the troops. The matter seems of some importance in regard to housing, and I am frequently being asked for a

certificate to try and persuade a landlord to deal with damp rooms because of the rheumatism alleged to have been produced.

REPLY—The relationship between dampness and rheumatism has for a long time been a controversial subject and the precise interaction is still not clearly understood. It is more than likely that damp has a deleterious effect on normal skin functions and may encourage catarrh and naso-pharyngeal infections, thereby weakening resistance to rheumatic and other infections. Yet, as "a practitioner" writes, the general privation of trench life in Flanders in 1914-18 produced few cases of rheumatism among the troops. This is difficult to explain and there are probably many associated factors. It is possible that damp surroundings are likely to produce symptoms in a latent case of rheumatism. It is almost universally agreed that a damp house is detrimental to health but it is not fully understood how it fosters the development of rheumatic disease. From a wide experience of the histories of rheumatic subjects, I have known cases occurring in a damp house and becoming aggravated under such conditions but improving on removal to a dry house. Damp and cold and other states of the atmosphere are believed to influence the development of rheumatic disease but, as my colleague Prof. Sir Leonard Hill has pointed out, it is dirt, artificially heated and ill-ventilated houses and density of population which, more than external weather conditions, are the cause, among other things, of rheumatic infection, such conditions being aggravated also by the lack of a protective diet. It is not without interest that the Medical Research Council investigations into social conditions in relation to acute rheumatism show that a higher proportion of rheumatic families than controls live in damp houses, but according to these reports the difference is not significant.

PHILIP ELLMAN, M.D., M.R.C.P.

ASPIRIN AND PEPTIC ULCER

In reference to his article in the April issue Sir Arthur Hurst has pointed out that certain editorial alterations obscured his meaning in an important respect. He writes—

I forbid tablets because all lumps, whether of food or chemicals are undesirable in patients with an ulcer especially of the stomach as they may lodge in the crater and cause intense irritation. I have known perforation follow the swallowing of a Blaud's pill, which was found in the peritoneal cavity. Aspirin and proprietary mixtures containing aspirin are objectionable for quite a different reason viz their direct irritant action. There is abundant evidence that they frequently give rise to hæmatemesis. Calcium aspirin is soluble and if taken powdered and with water is safe.

appeared spontaneously one to two weeks after completion of treatment

STERILE PETROLEUM JELLY IN PAPER TUBES

IN view of the present-day shortage of collapsible tin tubes, the account of the method of preparation of sterile petroleum jelly in paper tubes by L. A. W. Doe (*Pharmaceutical Journal*, February 12, 1944, 152, 69) is of particular interest. Test tubes are washed and allowed to drain overnight. Pieces of paper, about $3\frac{1}{2}$ inches wide and 2 inches longer than the test tubes, are cut, rolled on a mould to make a tube open at both ends and pushed well down into the test tube. The mould is then withdrawn leaving the glass tube with a paper lining which is filled with melted petroleum jelly, the paper is folded over at the top and sealed with a paper fastener. The tubes are then sterilized. Each tube contains enough for one application (about $\frac{1}{2}$ an ounce, using test tubes $5\frac{1}{2}$ inches). When required for use the paper containing the petroleum jelly is withdrawn and the test tubes returned for refilling. Points of importance in the preparation are—(1) a strong, thin paper should be used, (2) the paper should be cut with sharp scissors to give a clean edge, (3) a narrow paper spill or 2 mm. wooden applicator should be introduced between the paper and glass when filling the tubes, this provides an airway and thus prevents the petroleum jelly from remaining behind when the paper tube is withdrawn for use, (4) it is an advantage to soften the petroleum jelly with about 10 per cent liquid paraffin, (5) a series of small cuts made at the end of the paper tube ensure snug fitting into the lower end of the test tube and result in a smaller opening from which to squeeze the petroleum jelly. The test tubes are sterilized by heating at 150°C for one hour in a bath of the melted soft and liquid paraffin mixture.

AN INTRADERMAL TEST FOR

SULPHONAMIDE HYPERSENSITIVITY

At the present time the sulphonamide drugs are being prescribed on an ever-widening scale, an increased usage which involves a concomitant increased danger of sensitization. Investigations have been carried out at the Johns Hopkins Hospital in a series of seventy-six patients: thirty-eight of whom were thought to be clinically hypersensitive and thirty-eight thought to be non-sensitive, for controls, and the results are recorded by W. B. Leftwich (*Bulletin of the Johns Hopkins Hospital*, January 1944, 74, 26). Sera were obtained from patients who had been receiving sulphanilamide, sulphathiazole, sulphadiazine or sulphamezathine

(sulfamerazine U.S.A.), either by mouth or by parenteral administration for periods of one to fifteen days, with drug level of 2 to 20 mgm per cent. These patients, whose blood cultures were first proved to be negative as also the serological test for syphilis, were being treated for some acute bacterial infection. In order to control the test, their blood was also obtained either before administration of the sulphonamide drugs or during convalescence when the serum was quite free from the drug. 20 to 30 c.c.m. blood were withdrawn from the antecubital vein, placed in a sterile centrifuge tube and allowed to clot. The clot was separated from the container with a sterile glass rod and the tube centrifuged at high speed for twenty minutes. The serum was then pipetted off and placed in sterile rubber-stoppered containers, 0.5 c.c.m. being added to Brewer's medium, and incubated for seventy-two hours. Using a tuberculin syringe and a 26 gauge needle, 0.05 c.c.m. of the control serum and 0.05 c.c.m. of each of the sulphonamide sera were injected intracutaneously, the tests being placed above the controls. The size of the wheal and diameter of the erythema were measured immediately after injection and at five-minute intervals for twenty minutes. In negative and control subjects the size of the wheals increased only up to 1 or 2 mm (7 or 8 mm diameter), and the erythema, which was pale in colour, covered only a small area, up to 20 mm diameter. In the positive reactions there was an immediate increase of the wheal up to 12 to 18 mm diameter, and the erythema, which was intense, reached a diameter of 30 to 40 mm. Pseudopods developed when the reaction was marked. The reaction was maximum in fifteen minutes after injection, was fading in thirty minutes, and in an hour and a half all traces had disappeared. There was no incidence of delayed reaction. Thirty of the patients tested were definitely hypersensitive: eighteen to sulphathiazole alone, three to sulphanilamide alone, two to sulphadiazine alone, and four to sulphamezathine. Three other patients were sensitive to more than one drug, i.e., one to sulphapyridine and sulphathiazole, one to sulphanilamide and sulphathiazole, and one to sulphadiazine and sulphathiazole. Thus twenty-one patients were sensitive to sulphathiazole, this drug was used in the hospital in an amount approximately three times that of other sulphonamide derivatives. The test was found to be reliable in more than 90 per cent of the hypersensitive test subjects, of eight considered questionably sensitive it was positive in one only, two patients among those considered not hypersensitive clinically gave positive reactions.

REVIEWS OF BOOKS

Nervousness, Indigestion and Pain By
WALTER C. ALVAREZ, M.D. London
William Heinemann (Medical Books)
Ltd, 1944. Pp xii and 488 Price 25s

THE author, who is the consultant in the Division of Medicine of the Mayo Clinic, has chosen, as the title shows, a huge field for the exposition of his views. The work is entirely different from the usual textbook of medicine. It is especially suitable for study by the practitioner who has already had sufficient independent experience to realize how great are the problems of sick human beings as opposed to their diseases. It is a great philosophical treatise on human behaviour and reactions, full of sound observation and wisdom, and leavened by provocative opinion unspoiled by dogmatism. Perhaps the outstanding chapter is that which deals with diagnosis based on good history taking. The danger of mechanized medicine has become increasingly prominent in this country in the last two decades. Because English medicine is rooted in the clinical skill of physicians of the last few centuries we are still comparatively immune from the pernicious practice of calling for an array of special investigations before attempting to make a diagnosis. In America this is clearly not so, partly no doubt because of the freedom from financial worry which seems to be the lot of its great hospitals and clinics. Given the money to buy the latest aids to diagnosis it is only a matter of time for them to supersede hard thinking, unless the clinical teachers persistently warn their students and house officers of the danger. Whilst the greater part of the work deals with visceral symptoms arising from a psychoneurotic basis, the author seems to have tried to cope with too great a field in attempting to summarize the significance of such symptoms as dizziness, numbness, urticaria and so forth. It is what is left unsaid that constitutes the danger. It would be better if these sections were omitted, for amplification would entail a many-volumed treatise. Criticism might be directed to the reference to 'a normal afternoon temperature of 99.2° F' without qualification to his conception of waterbrash to "bad reaction to drugs" being pathognomic of a psychopathic nervous system, and perhaps to his views on telling the truth. He writes that he cannot remember any patient who committed suicide because he told him he had cancer. The reviewer has been less fortunate in telling a woman she had disseminated sclerosis. Surely there is no absolute right or wrong way to tackle this problem. The decision must rest largely on the estimate of the patient's mentality. However, these are small points and in no way

detract from the excellence of a book written by a physician of exceptional insight and sympathetic understanding.

Transurethral Prostatectomy By REED M. NESBIT, M.D., F.A.C.S. Illinois Charles C. Thomas, 1943. London Baillière, Tindall and Cox. Pp xii and 192. Plates 62. Price 41s.

ALTHOUGH there have been many articles on endoscopic resection of the prostate it has hitherto been difficult to find a complete and collected account of the procedure. This monograph supplies it in detail and, although no description can replace practical instruction at the hands of an expert, it will prove to be an immense help to those who are trying to master what is admittedly a difficult operation. The author uses his own modification of the McCarthy resectoscope, it can be worked with one hand leaving the other free for rectal palpation, and many advantages are claimed for such three-dimensional perception. The actual technique of the operation recommended is based on the anatomical arrangement of the blood supply to the prostate and aims at controlling these vessels first, leaving relatively avascular masses to be excised. This is sound in theory but sometimes difficult in practice, but is a logical step towards more accurate resection, bleeding is the chief impediment to transurethral prostatectomy. Anaesthesia, pre- and post-operative treatment, selection of cases and complications all receive proper attention. Great stress is rightly laid on an adequate fluid intake before operation. The volume is well produced and profusely illustrated: many original drawings having been made for it by W. P. Didusch. Over forty pages are devoted to a bibliography. It is a work which should be closely studied by all who practise transurethral prostatectomy.

Industrial Medicine Edited by SIR HUMPHRY ROLLESTON, Bt, G.C.V.O., K.C.B., M.D., F.R.C.P., and ALAN MONCRIEFF, M.D., F.R.C.P. With an introduction by Air Vice-Marshal SIR DAVID MUNRO, K.C.B., C.I.E., M.B., F.R.C.S. "The Practitioner" Handbooks. London The Practitioner and Eyre and Spottiswoode (Publishers) Ltd, 1944. Pp 202. Figures 5. Price 16s.

As one of the eighteen contributors to this latest addition to the "Practitioner Handbook" series points out, the majority of factories

country are essentially small, and it is to the general practitioner that workpeople must look for their medical care. This book is therefore designed for the general practitioner and it is packed with valuable information on a highly specialized branch of medicine. The book apparently grew out of a small but popular symposium and two-thirds of the contents are entirely new. Due importance is given to psychological problems and helpful sections deal with matters concerned with nutrition and with special aspects of industrial hygiene. Chapters on welfare services, on the ambulance room and on factory law complete an interesting volume which in its earlier sections includes an account of the chief disorders likely to be met with among the industrial population. Sir David Munro pleads in an eloquent introduction for a closer link between the industrial medical officer and the general practitioner. This volume provides the information to make such a link not only possible but secure and lasting.

The British Journal of Surgery General Index, 1934-1943 Bristol John Wright & Sons Ltd, 1944. London Simpkin Marshall Ltd Pp 125 Price 21s

IN his preface, Surgeon Rear-Admiral C. P. G. Wakeley, C.B., pays tribute to the firm of John Wright & Sons, publishers of the *British Journal of Surgery*, who despite the complete destruction of their works by enemy action in 1941 have nevertheless regularly produced the journal, and now this index, which will prove of great value to readers. The compilation of the index with the use of subject sub-headings greatly facilitates reference, and this plan is also happily followed for the presentation of reviews and notices of books. To have produced this excellent index under the adverse conditions of war is a matter of considerable credit to all those concerned with its compilation and publication.

A Provisional Classification of Diseases and Injuries for use in Compiling Morbidity Statistics Medical Research Council Special Report Series No 248 London H.M. Stationery Office, 1944 Pp 168 Price 3s

THIS report is produced by the Committee on Hospital Morbidity Statistics, appointed by the Medical Research Council in accordance with the request by the Ministry of Health for a system for collecting and recording statistics of patients admitted to hospital, using a standardized classification of diseases and injuries. It will be used in the preparation of the Medical History of the War, in which it is obviously desirable to have a close comparability between

the morbidity statistics of the fighting Services, the Emergency Medical Services and the Ministry of Pensions. This revised and amplified classification has been accepted for present use by the Ministry of Health. The classification is only provisional, however, as some modifications may be necessary at a later date. In order to render it comparable with the International List of Causes of Death and the Diagnosis Code of the United States Public Health Service, the list numbers of the former and the code numbers of the latter are given. The system of classification is explained in full in the opening chapter, and the final chapter of the report is devoted to a classification of occupations.

Historical Survey of Pharmacy in Great Britain By CARL SCHMEIDLER. London Harker, Stagg & Morgan, Ltd, 1944. Pp 91 Price 5s 6d

A survey is sometimes more revealing than a lengthy history, especially if the author is in a position to evaluate the effects which past events have had in shaping the development of his subject. Carl Schmeidler has had a wide experience of continental pharmacy and since Hitler's rise to power he has had an insight into conditions in Britain. In reading this book the impression is gained that some of the author's deductions are influenced more by his continental observations than by his research into past records of pharmacy in this country. Be that as it may, he has given an interesting and well-written picture of the long winding path which pharmacy followed from the Greco-Roman period to the middle of the 14th century, when the first shop dealing with the sale of medicines was opened in London, past the next 300 years and the milestone of 1617 when the apothecaries received their Royal Charter, down to 1841, the year in which the Society was founded and pharmacy began to take on its present form. In fact it is with pre-Pharmaceutical Society days that the greater part of the book deals, and events of the subsequent years are given scanty attention. The book is a helpful addition to the meagre literature on pharmacy in Great Britain.

The Journal of Mental Science Recent Progress in Psychiatry Edited by G. W. T. N. FLEMING, M.R.C.S., L.R.C.P., D.P.M. London J. & A. Churchill, Ltd, 1944 Pp 509 Price 30s

PUBLISHED by the authority of the Royal Medico-Psychological Association, this volume contains articles which have appeared during the five-year period 1938-42-43, during which time considerable advances have been made in

REVIEWS OF BOOKS

psychological medicine. The subject is a large one and, as the editor states in his introduction in which he deplors the loss of access to Continental literature on the subject, sound knowledge cannot be attained by only a brief study. Nevertheless, the practitioner will find much of vital interest because, whether or not psychiatry is a peculiarly difficult speciality, a working knowledge of this subject is essential to present-day medicine. The articles, which number twenty-seven, have been most wisely chosen for a general presentation of the different aspects of the subject, and for this reason it is almost impossible to select any for special mention, but without doubt those dealing with child psychiatry, delinquency and mental defects, which are of considerable topical interest, as also the subjects of endocrinology in relation to psychological defects, genetics in relation to psychological defects, and the mental convulsion and insulin therapy, and the mental health services, present and future, will have a wide general appeal. It is a pity that in compiling this most useful book an index was omitted, as the reader's enjoyment is handicapped by laborious search for special points of interest.

The British Encyclopædia of Medical Practice, Medical Progress and Cumulative Supplement, 1944. Under the general editorship of SIR HUMPHRY ROLLESTON, Bt., G.C.V.O., K.C.B., M.D., F.R.C.P. London. Butterworth & Co Ltd, 1944. Pp v, 126 and 307. Price 37s 6d the two volumes.

THE fifth publication of the Medical Progress and Cumulative Supplement volumes, opens with an interesting survey of the Public Health activities in the present war. In Part II, devoted to drug therapy, there is a useful section on penicillin, and the use of this substance in surgery is also referred to in the article dealing with surgical advances. A cumulative index covering the period 1939-44 has been included in the present publication: this is a welcome and useful addition.

NEW EDITIONS

Methods of Treatment, by LOGAN CLENDENING, M.D., and EDWARD H. HASHINGER, A.B., M.D., in its eighth edition (Henry Kimpton, 50s) has been subjected to revision and a considerable amount of new material added, including the treatment of intractable pain with cobra venom, advances in the treatment of diabetes mellitus, the new sulphonamide drugs, the use of vitamin K in the treatment of prothrombin deficiency, and a number of other recent

advances in medicine. In the section on infantile paralysis a subsection on the treatment of poliomyelitis by the Kenny method has been added. These are but a few additions taken at random from the many included in the new edition of this well-known textbook, which has been brought up to date in all sections. The illustrations number 138, and there are many useful prescriptions.

A WAR-TIME supplement, dealing with the necessary precautions for diabetics under war-time conditions, insulin supplies and how to proceed when enforced reduction or omission of the drug has to be faced, adaptation of food changes and recipes, among which some useful winter salads are included, has been added to the thirteenth edition of *The Diabetic Life*, by R.D. LAWRENCE, M.D., F.R.C.P. (J & A Churchill Ltd, 10s 6d). In the preparation of this new edition the book has been rewritten and there is much fresh information on the action of the different insulin preparations: a whole chapter has been devoted to the treatment by soluble insulin alone. It is interesting to note that the author has suggested the name of "oxyhyperglycemia" for the term "lag storage curve" introduced by Maclean in 1920. There is so much that is new in this edition that a copy should be in the hands of all practitioners.

The Diseases of the Endocrine Glands, by HERMANN ZONDER, M.D. in its second English edition (Edward Arnold & Co, 40s) represents in the main a translation of the German edition published in 1926. Alterations and additions have been made, however, particularly as regards recent knowledge of the physiology and pathology of internal secretion and its intimate relation with the hormones. The importance of this subject in clinical endocrinology is stressed throughout the book which, being the work of one of the world's leading endocrinologists, is too well known to call for detailed description. It remains but to add that the new edition is well produced, richly supplied with figures and illustrative cases from the author's personal observations, and beautifully translated.

DR A. D. BELLIOS and his collaborators deserve warm praise for their excellent volume called *A Handbook of First Aid and Bandaging*, now issued in a second edition (Baillière, Tindall and Cox, 4s). It is suitable both for elementary and advanced instruction, and the whole book is well planned, clearly written and comprehensive in its scope. Surgeon Rear-Admiral C. P. G. Wakeley commends it in a foreword as the best book he has seen on the subject and such praise is not exaggerated.

NOTES AND PREPARATIONS

NEW PREPARATIONS

Puree of LIVER A & H—Prepared by a process which is stated to eliminate the unpleasant flavour of fresh liver whilst preserving the hepatopoietic factors, proteolysed liver A & H is indicated in the treatment of certain nutritional anemias and those due to nutritional deficiency, and is claimed to be more potent than its equivalent in fresh liver. The manufacturers are Allen & Hanbury's Ltd, 13, Abchurch Lane, London, E.C. 4, by whom the product is issued in two sizes, 4 and 8 ounces, 1 ounce being equivalent to 8 ounces of fresh liver.

Sulfex (suspension of micro-crystalline sulphathiazole 5 per cent in isotonic solution of *p*-hydroxy-*p*-methylphenylethylamine hydrobromide) has been prepared for use in the treatment of otolaryngological conditions, such as nasal and sinus infections, especially those secondary to the common cold. Sulfex is issued in 1-ounce bottles by Menley and James Ltd, 123, Coldharbour Lane, London, S.E.5, from whom further particulars can be obtained.

Thiourea is a derivative of thiourea, has undergone extensive clinical trials, particularly in America, in the treatment of thyrotoxicosis, although it must be used with caution. Genatone Ltd, Loughborough, Leicestershire, are now launching thiourea for oral use in tablets of 10 grains, in packs of 100 and 1,000, and thiourea in 5-grain tablets in equivalent packings. Literature is obtainable on application.

INFANT WELFARE

The advertisement entitled *The Care of Your New Baby*, considered with the important questions of feeding its compilation a general routine for bringing up a healthy 'Provisional Class' of children, issued by the Child Welfare Bureau, University College, Hospital, London W.C.1, copies of which, statistics, Medical obtained on application to the

Special Report Series

H.M. Stationery Office, AL NOTICES

Price 3s

This report is prepared by the Medical War Memorandum Hospital Morbidity Statistics, appointed by the Medical Research Council in accordance with the request by the Ministry of Health, Office, price system for collecting and recording statistics of patients admitted to hospital, using a standardised classification of diseases and injuries. It is of cross be used in the preparation of the Medical History of the War, in which it is obviously desirable to have a close comparability between

the Ministry of Health describing adopted when the mother and infant home and those to be followed where care is necessary. **Malaria** The Health have issued this pamphlet the diagnosis and symptoms of malarial fever prepared for the use of medical practitioners in view of the fact that on returning from abroad. The disease and it is necessary for practitioners to be aware of the symptoms. **Venereal Disease for Practitioners** (Circular No. 50/19 by the Ministry of Health and the Health for Scotland. The author Harrison, D.S.O., M.B., Ch.B., F.R.C.P. deals in a most satisfactory manner the necessary tests and their technique with the treatment of gonorrhoea, chancres, syphilis. There is a useful index. **Resettlement of Disabled Persons** A series of schemes for rehabilitation of injured soldiers issued by the Ministry of Labour National Service, St. James's Square, S.W.1. **Conditions for Industrial Efficiency**, pamphlet No. 2, entitled *A Workman's Prevention of Fatigue*, which is the Industrial Health Research Board Medical Research Council, can be obtained from H.M. Stationery Office, price 3d. It is a monograph dealing with the causes, the prevention of absenteeism, and the prevention of fatigue and boredom.

CONTENTS FOR JULY, 1924

MODERN TUBERCULOSIS PROBLEM
Mortality and Morbidity in Tuberculosis Percy Stocks, M.D., D.P.H.
Mass Miniature Radiography and Pulmonary Tuberculosis By Group Capt. R. R. McC. M.D., F.R.C.P.
The Early Clinical Manifestations of Pulmonary Tuberculosis By N. Tattersall, M.D.
Tuberculosis in Childhood By Willford Ford, M.D., F.R.C.P.
The Scope of Surgery in Pulmonary Tuberculosis By T. Holmes Sellers, D.M., F.R.C.S.

Cell Health I—Introductory
and the General Practitioner
Percival, V.

